3 types Vaughn MOTOBLOX

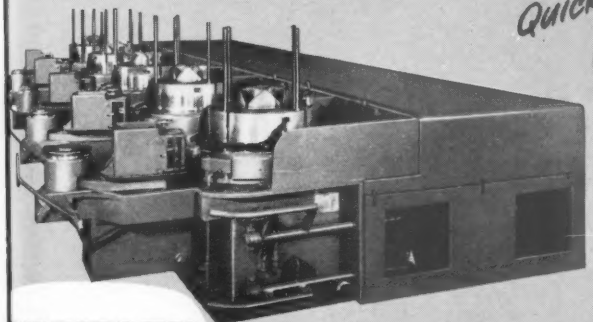
HRX

LARGEST MACHINE FOR CONTROLLED SPEED DRAWING OF STEEL WIRE

HRK *New*

UNIT TYPE CONSTRUCTION FEATURING HORIZONTAL SPINDLES AND OFFSET BLOCKS

"Always Quick on the Draw!"



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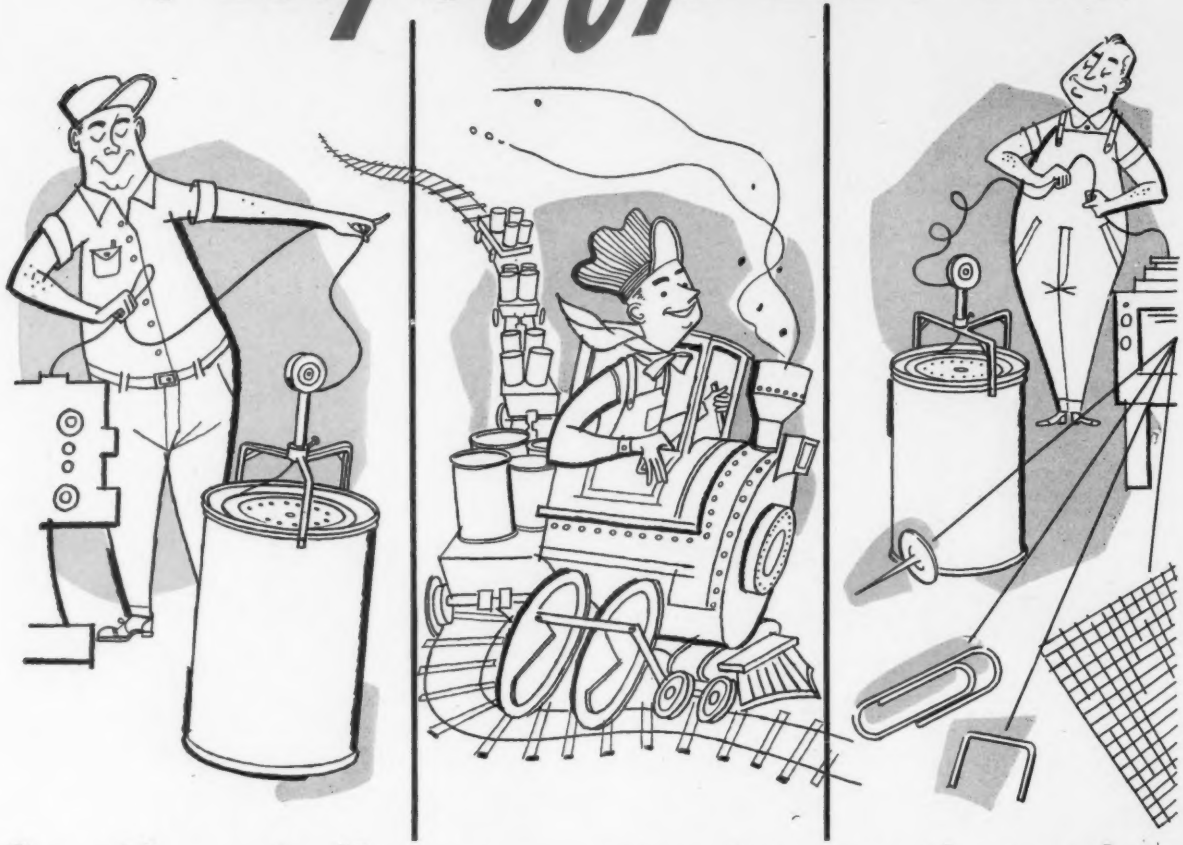

Continental's new way to send a wire

By automatically packaging wire as it is drawn, Continental's Payoffpak has revolutionized the handling of wire! These fibre drums put an end to small manually handled coils that are costly to produce and costly to use. What's more, the wire is untouched by dirty or sweaty hands and remains protected in the sturdy drums until ready to use. Lightweight Payoffpaks can hold 600 lbs. of wire each; high stacking strength means you can save on storage space too.

So check into Payoffpak—it will mean bigger profits for you. Call Continental soon for the interesting facts.

CONTINENTAL CAN COMPANY

FIBRE DRUM AND CORRUGATED BOX DIVISION

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has completed its First year in its new building (shown above).

During the past year we have initiated many NEW CUSTOMER SERVICES. Below are listed a few:

UNIFORM DRUM WEIGHTS ------ **to simplify receiving and inventory.**
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RETAINED SAMPLES ---------- **to compare and check each shipment.**
UP-TO-DATE LABORATORY ------- **to develop new products.**
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These and many others are the reasons why modern and progressive wire mills patronize *"Standard"* for *"America's Finest Wire Draw".*

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

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The UNIVERSAL (Type G5) As shown above—For all standard constructions of road slab reinforcing, building mesh, etc.—wire sizes from 3/0 to 11 gauge.

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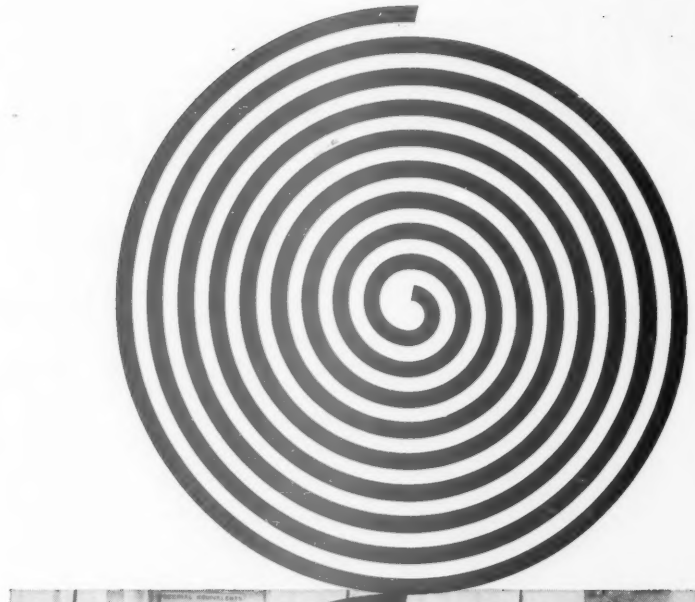
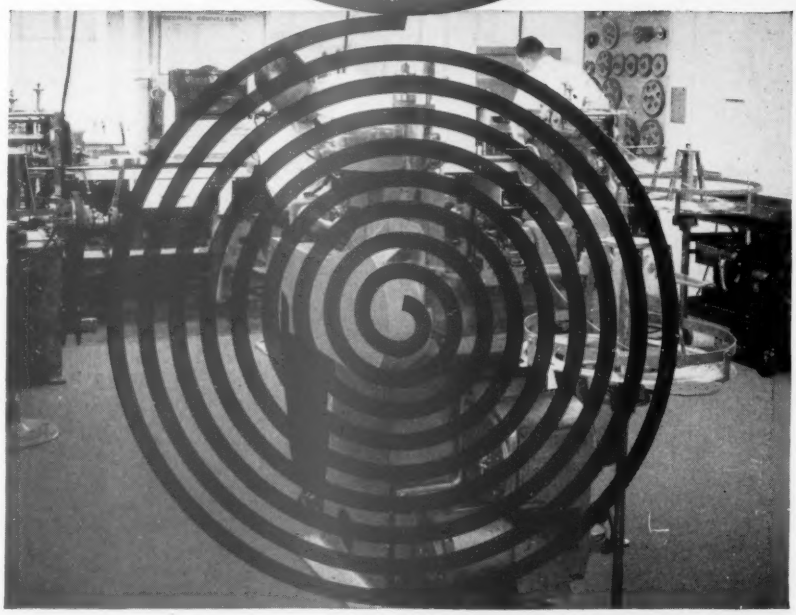
SPRING CLINIC

Torrington leads the field in the development of the most advanced wire forming equipment available today. One of the reasons is Torrington's Wire Forming Laboratory, devoted exclusively to the professional springmaker's problems. This kind of close and constant study of our customers' needs has resulted in wire forming machinery tailored to meet the toughest requirements for versatile and economic production. If *you* have problems in coiling or costing, your inquiries will be classified CONFIDENTIAL!





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TORRINGTON
MANUFACTURING COMPANY
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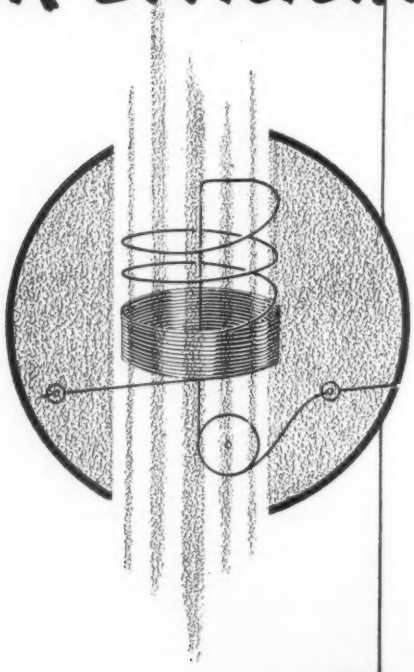


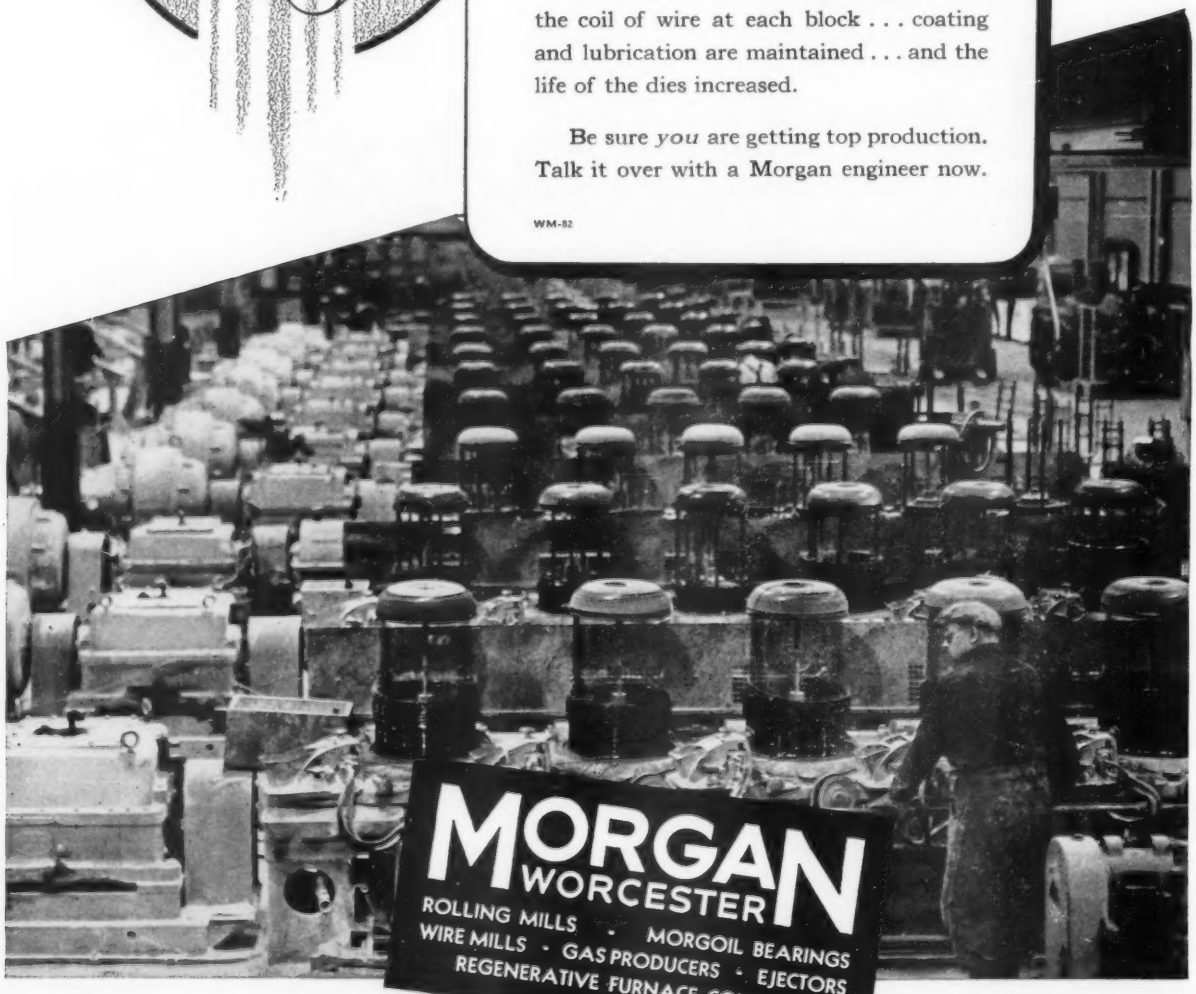
keeps these MORGAN-CONNORS producing at high speeds

Because of this fast and efficient air cooling high carbon wire can be drawn at high speeds, and meet the most exacting physical specifications.

Air is blown *up through* and *around* the coil of wire at each block . . . coating and lubrication are maintained . . . and the life of the dies increased.

Be sure *you* are getting top production. Talk it over with a Morgan engineer now.

WM-82



MORGAN CONSTRUCTION COMPANY • WORCESTER, MASSACHUSETTS

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 July, 1957 No. 7

Designated as Official Publication By The Wire Association

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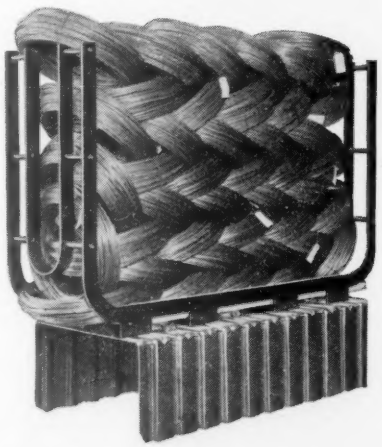
NEW IDEA

IN WIRE HANDLING

- **Saves Floor Space**
- **Reduces Costs**
- **Frees Cluttered Aisles**



Republic's new Stack 'N Store Units provide a practical and economical solution to the problem of wire handling.

The units are especially adaptable to bulk material, such as coiled wire, that does not require the use of completely enclosed sides. Specially designed "U" shaped superstructure permits high stacking of coiled wire.

Fully loaded superstructures are handled quickly and easily by crane. Or superstructures may be placed on skids and the entire unit readily moved to a storage area by lift truck.

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Company_____

Address_____

City_____ Zone____ State_____

U.S.I.

Vol. II, No. 3

POLYETHYLENE PROCESSING TIPS

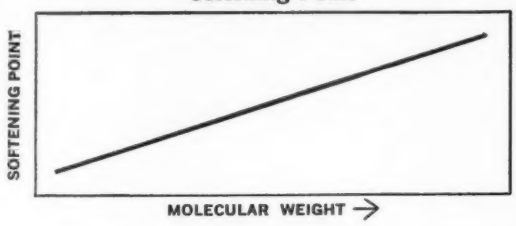
HOW MOLECULAR WEIGHT AFFECTS POLYETHYLENE PROPERTIES

Molecular weight is one of the three most important resin characteristics that determine end-use properties of polyethylene. *Density* and *molecular weight distribution* are two others.

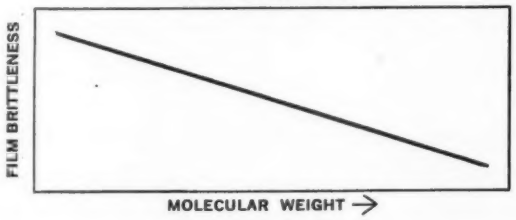
Melt Index is an approximate measure of molecular weight. Resins with low molecular weight have high melt index values, and vice versa.

The following graphs show the effect of increasing molecular weight, (or decreasing melt index) assuming that density and molecular weight distribution remain constant. In practice, of course, these characteristics are different for different resins so the effects of all three must be considered.

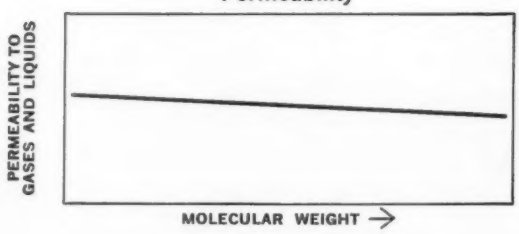
Softening Point



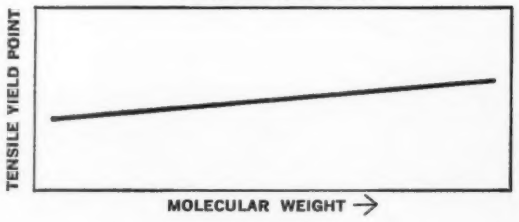
Film Brittleness



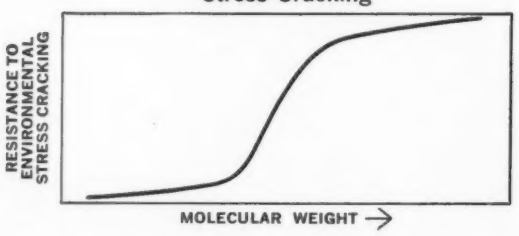
Permeability



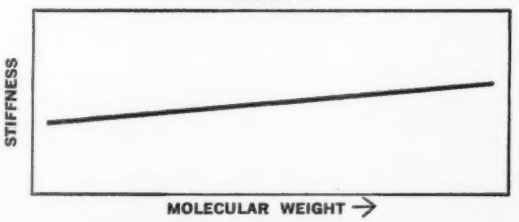
Tensile Yield Point



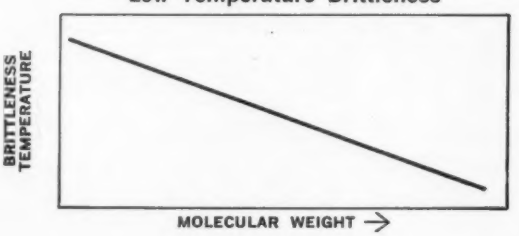
Resistance to Environmental Stress Cracking



Stiffness



Low Temperature Brittleness



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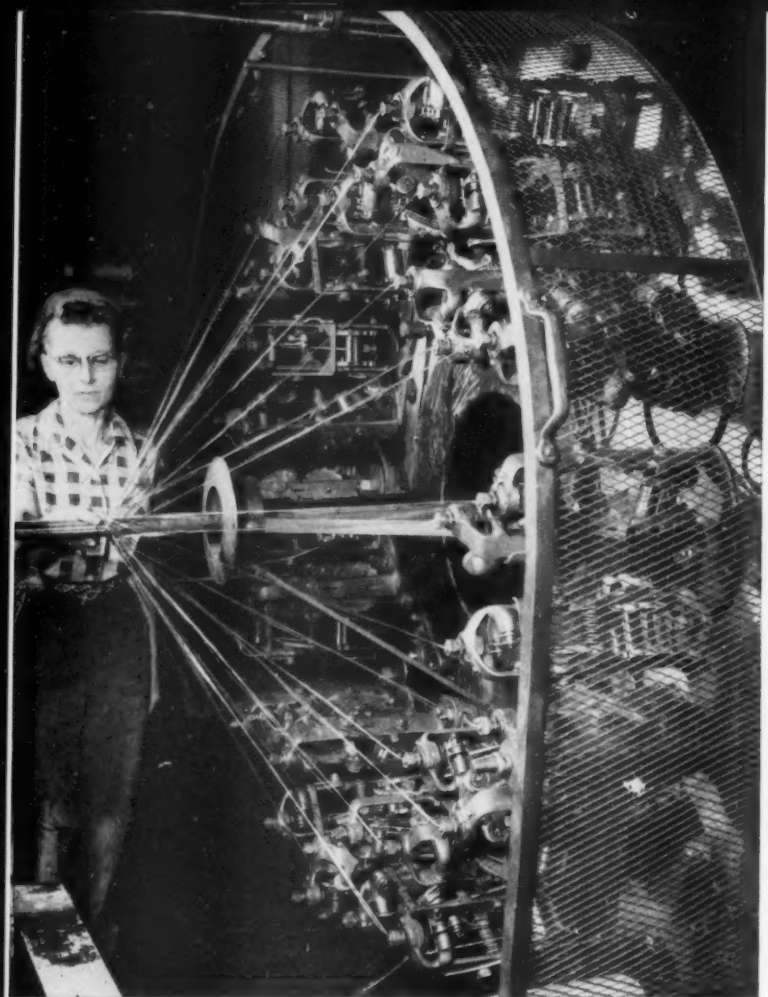
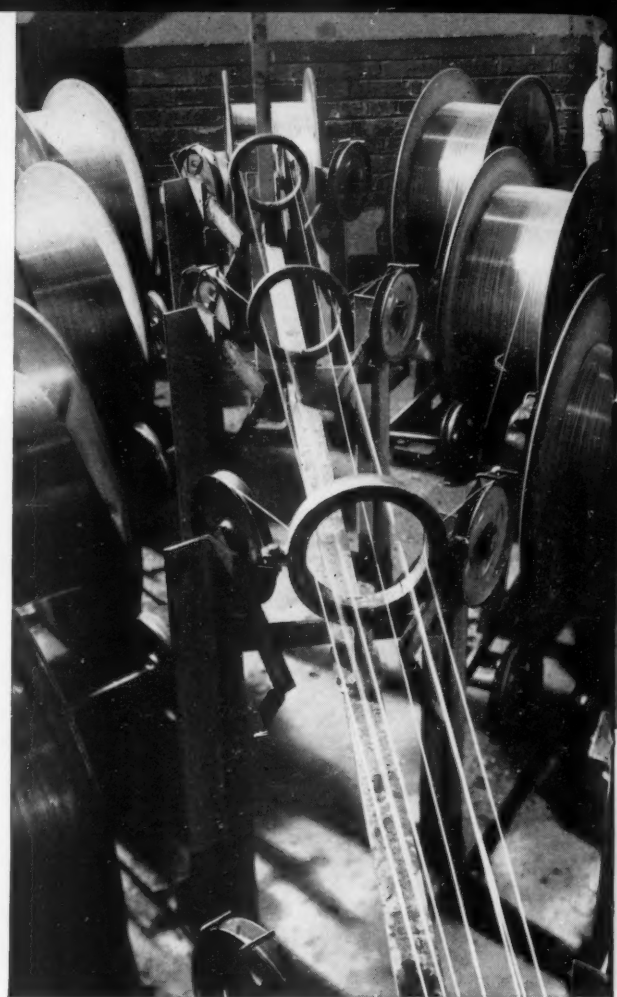


B. F. Goodrich Company braids multiple strands of steel wire into intricate sinews around rubber tube to help control and resist tremendous internal pressures required of flexible hydraulic hose. Wire such as supplied by Johnson has tensile strengths ranging from 240,000 to 400,000 psi.



Firestone Tire and Rubber Company uses only high tensile steel wire of exacting tolerances in building tire beads. Rapidly entering the bead machine in parallel —three to fifteen wires wide, depending on strength specified—the wires are coated with rubber. Clean bronze finish on Johnson wire assures proper rubber adhesion.

The best names in rubber use Johnson wire for strength and safety in tires and hose

The rubber industry has a sound reputation for producing quality products in advance of its needs by use of imaginative research—painstaking development of production methods—careful selection and testing of component materials.

Goodyear—Firestone—U.S. Rubber—B. F. Goodrich—Thermoid and others have established their names over the years by giving the general public and industry alike—strength, safety and durability in products such as long lasting pneumatic tires and tough pressure hose.

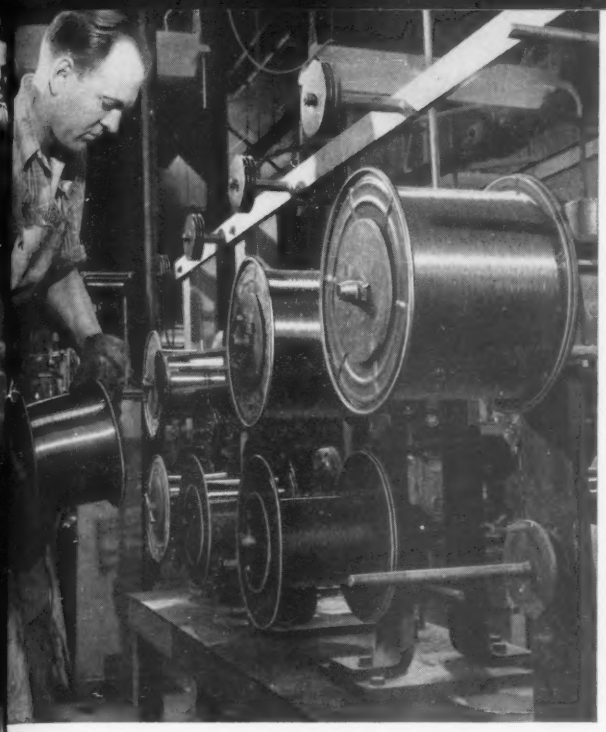
These two products owe their strength in part to the fine steel wires hidden inside them. For it is high-carbon steel bead wire which gives a pneumatic rubber tire—no matter what its size or job, the strength demanded by modern vehicles. Similar wire gives pressure hose its strong sinews which enable it to withstand working pressures as high as 10,000 psi—bursting strength may be three to four times as great.

Take the case of tire bead wire which Johnson supplies to every major tire manufacturer in the country. It is precision-drawn from special high-carbon rods to .037″ in diameter with a tolerance of only .002″—so fine that a 750-pound reel contains 39 miles of wire. Yet, a single strand exceeds 290 pounds of breaking strength equal to a tensile strength of 270,000 psi.

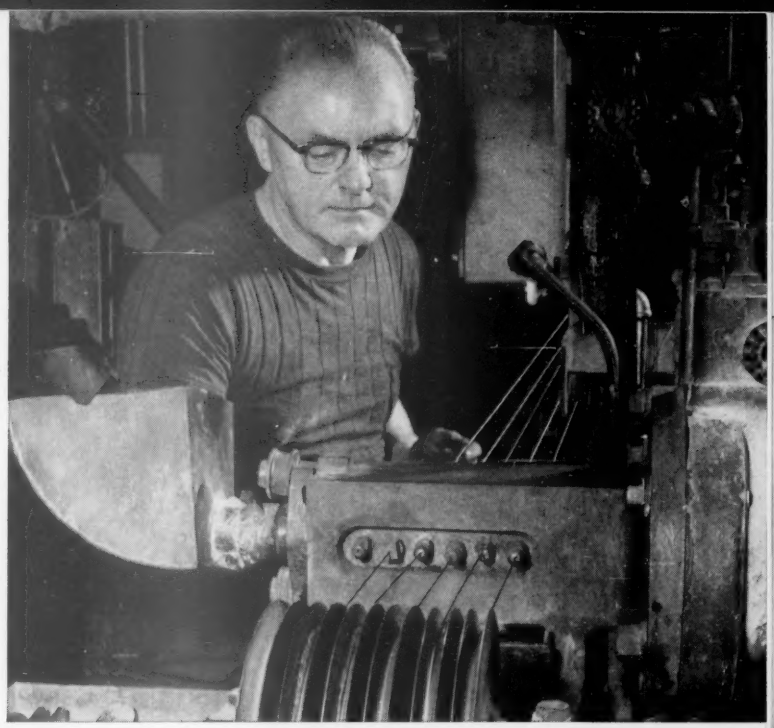
Also the wire must present a clean, unbroken surface and have a good and uniform bronze finish. This finish makes possible tight adhesion between the wire and the rubber surrounding it.

All these qualities contribute to the tire bead strength, help assure the safety of those who ride for work or pleasure on pneumatic tires.

Another special wire made by Johnson for the rubber industry helps rubber hose contain enormous pressures demanded by modern industrial applications. This reinforcing wire is drawn from selected high-



Thermoid Western Division of Thermoid Company has cut wire rewind loss to ½ of 1% by use of Johnson Discard-a-Spool which eliminates overlaps and tangles, protects wire quality in shipment. The one-way disposable spool weighs only 28 ounces vs 200 ounces for standard spool—slashes tare weight 14 times.



United States Rubber Company wires tires for strength on this bead building machine. The strength comes from the steel wire bead in the edge of each tire. Johnson makes special high-carbon steel wire—.037″ in diameter with tolerance of only .002″ for U.S. and other major tire companies.

carbon steel in diameters ranging from .008″ to .020″ and has exceptional dimensional accuracy—tolerance is plus or minus .0005″.

Johnson hose reinforcement wire is supplied with a special liquor finish to provide maximum adhesion of steel to the rubber which fills the interstices between braids.

The wire is uniformly cast to make possible even spooling and has uniform tensile strength to prevent breaking under the working tension.

These excellent wire qualities, plus careful packaging and prompt delivery, have resulted in Johnson becoming a prime supplier to the rubber industry for hose reinforcement wire.

The outstanding performance of Johnson wire in the rubber industry is typical of the experience in other industries where Johnson supplies aircraft cord wire, armature binding wire, wire for brushes, metal stitching, preformed staple wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire in a wide variety of sizes and finishes.

If you use specialty wires, call one of the offices listed to right and explore the advantages of Johnson quality which combines strength with economy.

The Goodyear Tire & Rubber Company finds that Johnson meets their exacting requirements for tire bead wire which has high tensile strength, twisting strength, elongation and special surface finish. Here parallel tire bead wires uncoil evenly into a bead building machine.

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Chicago	Dallas	Detroit	New York	Tulsa
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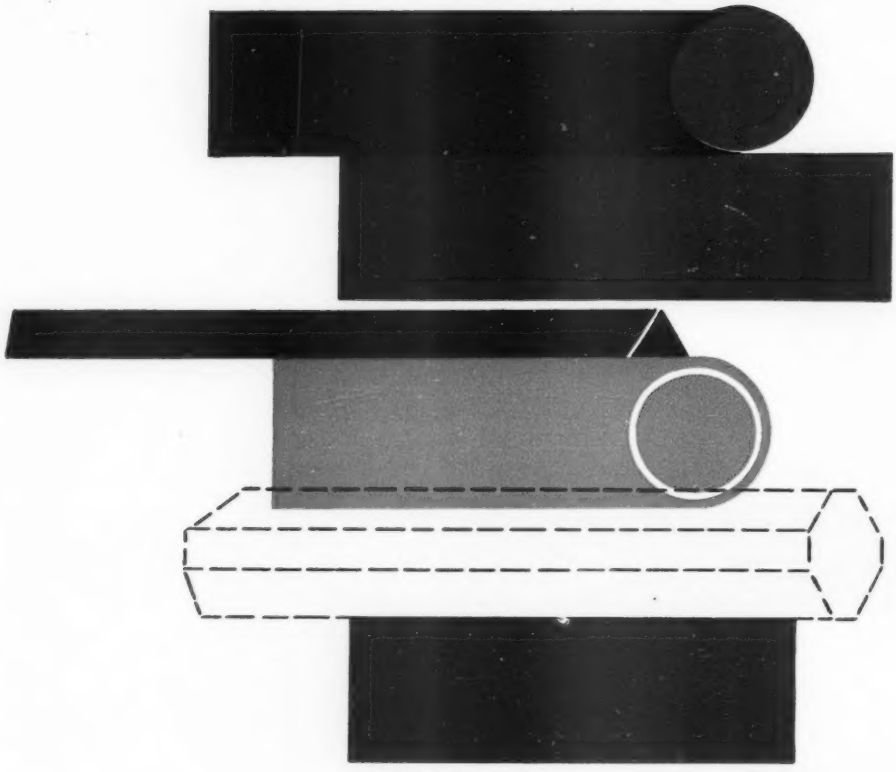
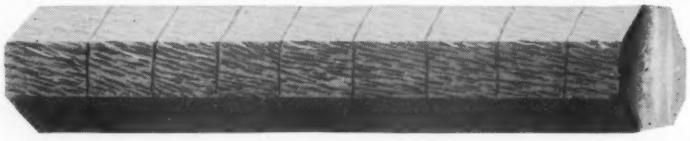


tightly wraps bars, coils and tubing



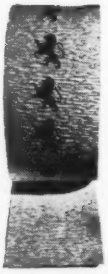
"Arksafe" spiral wrap

"Arksafe" creped spiral wrap absorbs shocks and temporarily gives under the "pull" of modern high speed wrapping machines. In returning to its original shape it tightly wraps your coils, bars and tubing.

Each roll of "Arksafe" crinkled spiral wrap has a percentage of stretch to provide the maximum yardage without sacrificing the strength needed to properly protect your products.

There's a size and construction for your particular needs for use on your present equipment.

Specify "Arksafe"—made by the originators of crinkled kraft for industrial use.



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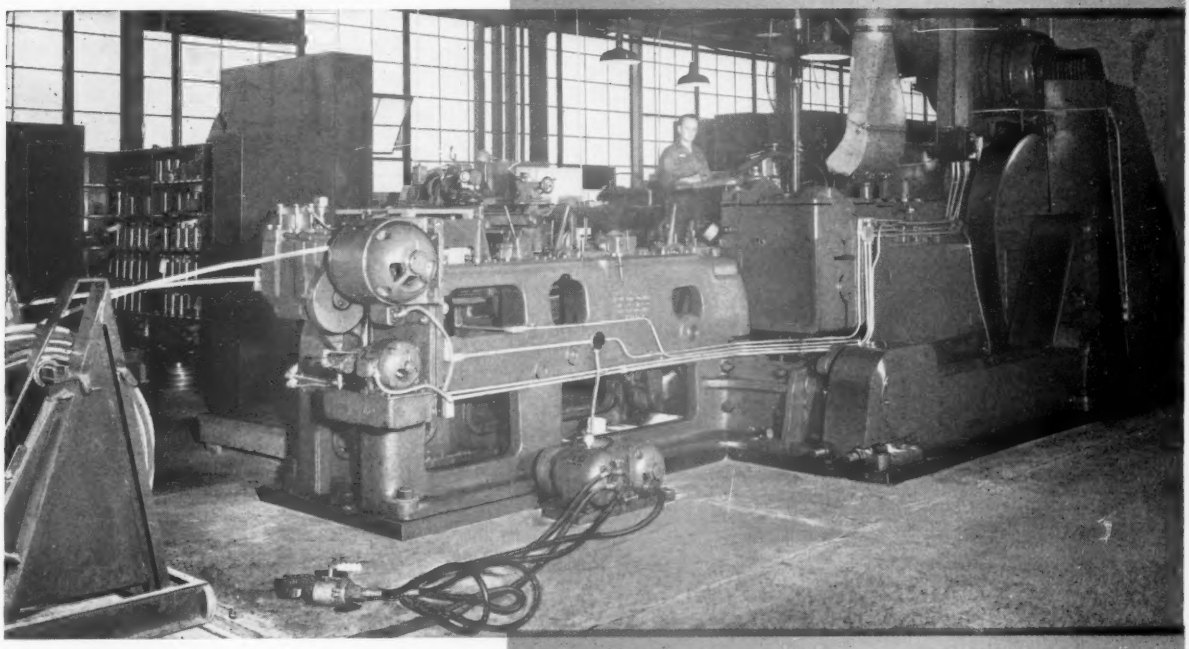
Ajax-Hogue Wire Drawers

Built in Eight Sizes *for* All Cold Headers



Courtesy of Lake Erie Screw Corp., Cleveland, Ohio

AJAX-HOGUE WIRE DRAWERS Can be attached to any make Cold Heading Machine with which we are familiar.

It is a complete Wire Drawing unit driven from the header by roller chain. Built in eight sizes, it can handle all diameters of rod from the smallest available, namely No. 5 size rod up to a maximum of 1½" diameter.

LOWER MATERIAL COSTS
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STRAIGHT WIRE BLANKS

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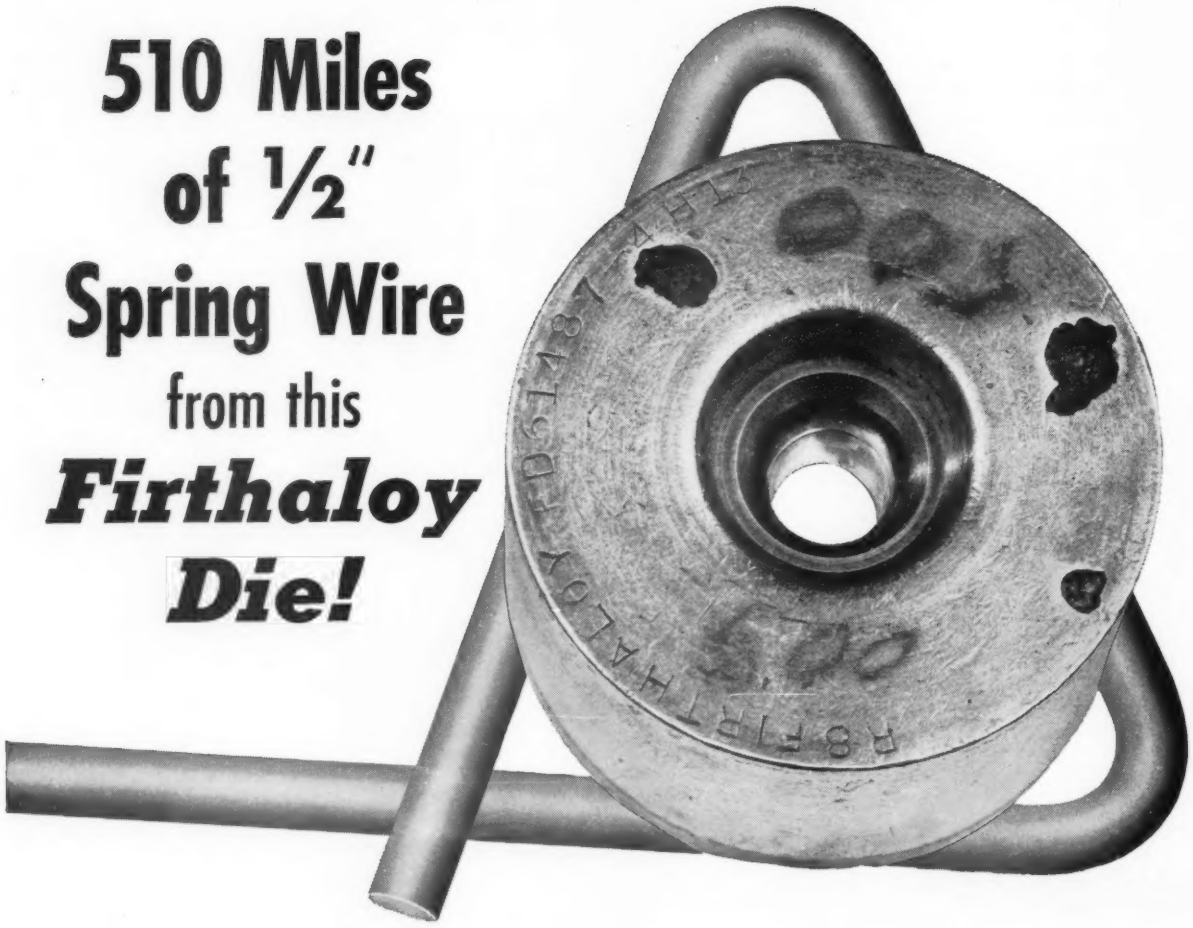
510 Miles of ½" Spring Wire from this *Firthaloy Die!*



The unretouched photo of the Firthaloy draw die above may not be very pretty—but what die would be after drawing 1,800,000 lbs. of ½" high carbon spring wire! The important fact is, that despite the appearance of the steel casing, the Firthaloy carbide nib (standard grade H-13) had worn *only 1/1000 of an inch when it was retired after 6 years of continuous service!*

The leading New England manufacturer who returned the die to us for our "museum" thinks his 1948 purchase was a good one.

You, too, can get comparable results when you specify *Firthaloy* for your own die shop or from your tool and die maker . . . in round, square, hex and all special shapes.

Write for information or literature today

Mr. Tooley says—

"Firth Sterling offers wire manufacturers and fabricators the advantages of a *single* source of supply for both tungsten carbide dies and high grade die steels. This *complete* line, from famous Firthaloy carbide through almost one hundred grades of high speed and tool steels saves you time and money."

R-312

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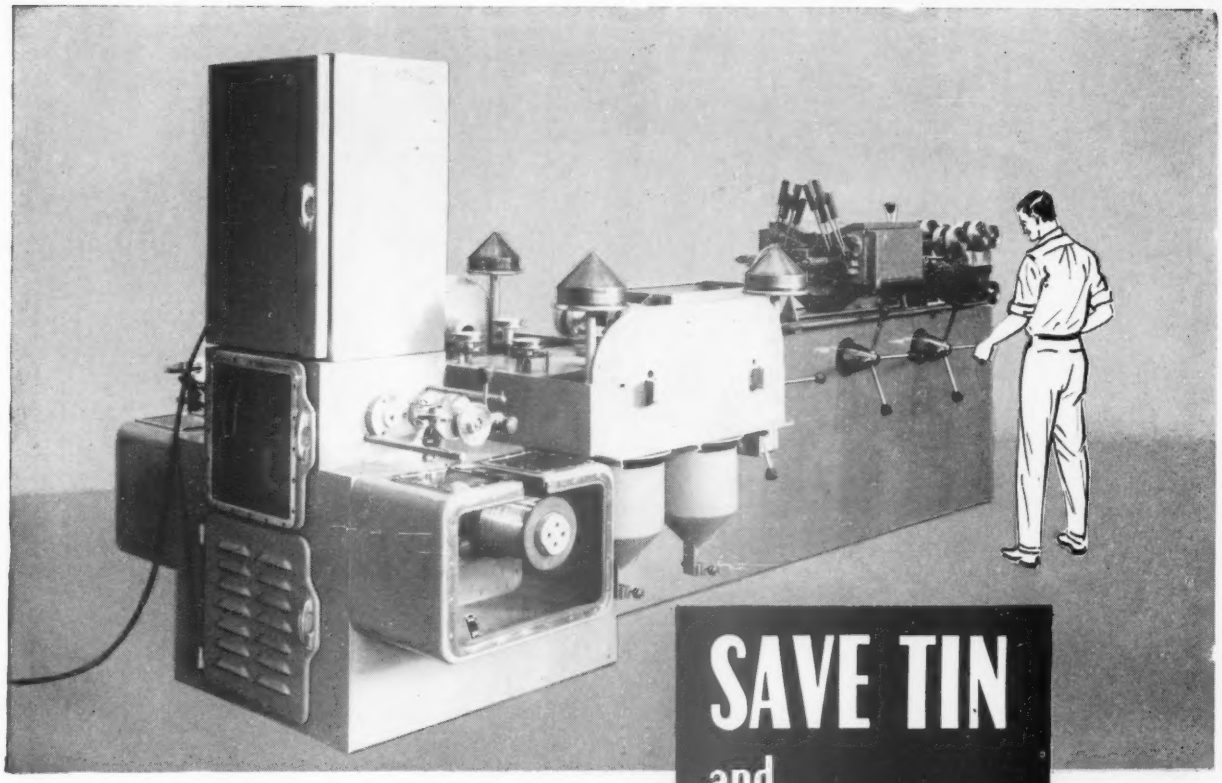
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

FIRTH STERLING TRADE MARK



JEAN MARQUENE.

SAVE TIN and FLOOR SPACE

with the new *Godderidge*

HIGH SPEED HOT DIP TINNING MACHINE

OUTSTANDING FEATURES :

NUMBER OF WIRES : 2
DIAMETER OF WIRES : from 24 to 38 B & S
TINNING SPEED : up to 5000 feet per min.
CONSUMPTION OF TIN : Considerably reduced by diamond dies
REELS (pay-off and take-up) : 25 Lbs
PRODUCTION in 16 hours : about 1000 Lbs of 32 wires
FLOOR SPACE required : 600 square feet only

For further details write to :

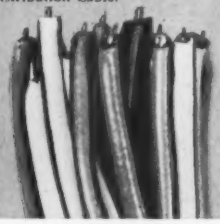
Godderidge

11, av. HENRI BARBUSSE
HOUILLES (Seine-et-Oise)

FRANCE

THE MESSAGE IS: MONSANTO

Sturdy OPALON 72285 over primary insulation for color-coded, weather-resistant jacketing. Polyethylene 14202 and 11302 for primary insulation of conductors and insulation for steel support wire in Multi-Pair Distribution Cable.



Polyethylene 12203 and 12253 for primary insulation, Polyethylene 14202 for jacketing in jacketed Thermoplastic-insulated, Thermoplastic-sheathed Telephone Cables.

OPALON 1706 for semi-rigid primary insulation in various types of communication cable.

Rugged weather-resistant color-coded OPALON 72285, available in eight standard colors, for primary insulation and Polyethylene insulation for steel support wire on Urban Distribution Cable.

OPALON 1006 for primary insulation, OPALON 72217 for jacketing in Inside Telephone Wiring Cable.

your finest single-source for ***polyethylene and vinyl*** *telephone insulating compounds*

Wire and cable producers like the multiple choice that Monsanto supply offers—9 formulations, polyethylene or Opalon vinyl, all specially developed for critical communications applications.

Here, from one great single-source, are the insulating compounds combining the many different mechanical and electrical properties you need . . . insulating efficiency, extrusion characteristics, surface finish, weatherability, colorability.

Call in your local Monsanto representative for the full communications story, or write for technical data and other information to Monsanto Chemical Company, Plastics Division, Room 2010, Springfield 2, Massachusetts. OPALON: REG. U. S. PAT. OFF.

MONSANTO

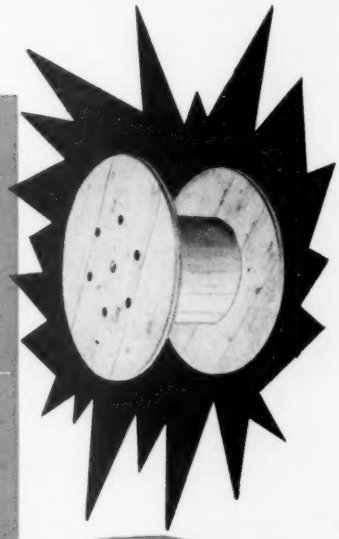
NON-RETURNABLE

WOOD REELS IN ALL SIZES FOR ALL TYPES OF ELECTRIC WIRE AND CABLE . . .

B. J.—

This looks interesting to us in Production. Suggest you investigate Bridge Reels today. Advise me when you hear from Bridge

A. F. G.



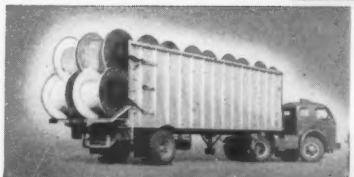
YES

YOU SAVE WITH NON-RETURNABLES

LOOK AT THE ADVANTAGES

- **Reduce Reel Investment**
- **Less Storage Space**
- **Lower Freight Cost**
- **No Bookkeeping**
- **No Repair Costs**
- **No Return Freight**
- **No Deposit**
- **No More Headaches**

NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST



HIGH SPEED
SHIPPING SERVICE IN OUR OWN TRUCKS

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.

BRIDGE
MANUFACTURING COMPANY
HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
Riverview 9-8308

"REEL GOOD . . .

Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"

With

NOPCO® KLY

a liquid fine wire drawing lubricant

Be sure to try Nopco KLY next time you're drawing fine size steel or fine and intermediate size copper wire. It's *different*—and everything different about it you'll find is a big advantage.

First, this emulsifiable oil mixes quickly and completely with water—hot or cold. This feature alone is enough to make it ace-high with you. But it has other advantages equally important.

Your bath lasts longer. Nopco KLY has a built-in affinity for water. Its lubricants stay *uniformly active* much longer, since the "drag out" of the lubricants from the solution is reduced beyond anything you've ever seen.

Prevents Formation of Insoluble Copper and Lime Soaps—both the copper soaps, which score dies, clog feed lines and screens; and the lime soaps you've been bothered with when drawing lime coated steel wire.

KLY may be used for high carbon, low carbon, limed, galvanized, and liquor finished fine steel wire—also for fine and intermediate copper, bronze, and brass wire. You'll surely want to try this die-saving, cost-saving lubricant soon. Write today for free booklet "Nopco KLY", which gives full instructions, lists percentages of fat in all emulsions.
Nopco Chemical Company,
Harrison, N. J.

1907–1957
50 Years
OF PROGRESS IN CHEMISTRY

YOU MIX IT FASTER, EASIER

YOUR BATH LASTS LONGER

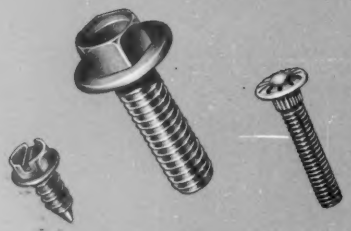
YOU GET UNIFORMLY ACTIVE LUBRICATION

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.
London, Canada

KEYSTONE XL WIRE STUDY

Wider diameters with less cracking on specials



Up to 4 times the die life on production runs

Eliminate one shaving operation

Consistent quality products

...for UNIVERSAL SCREW COMPANY using KEYSTONE XL WIRE

flowability IS THE SECRET

Here are a few products cold headed by Universal Screw Company, Evanston, Ill. This firm has used Keystone Heading Wire since 1950. Their president, Arnold Meyer, says, "We prefer Keystone for their flexibility, prompt attention, freedom from complaints on their wire and willingness to work with us. We have found Keystone Wire gives less grief, and we've been able to produce many difficult parts because of the exceptional *flowability* of Keystone Heading Wire. Keystone's delivery schedules are strictly adhered to. We have cut our inventory substantially because of Keystone's excellent service."

See your Keystone representative for complete details — or, for the name of Keystone Wire users who can help you, call us.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE
WIRE FOR INDUSTRY

View of a few of the modern thread rolling machines at the Universal Screw Company, Evanston, Illinois.

Keystone Steel & Wire Company, Peoria 7, Illinois

Brand New . . . COLD HEADING FACTS FOLDER . . . send coupon today! New folder discusses uses, applications, methods, technical facts, wire requirements.

Name_____ Title_____

Company_____

Street_____

City_____ State_____

If

you use

SHAPED STOCK

a

SHUSTER

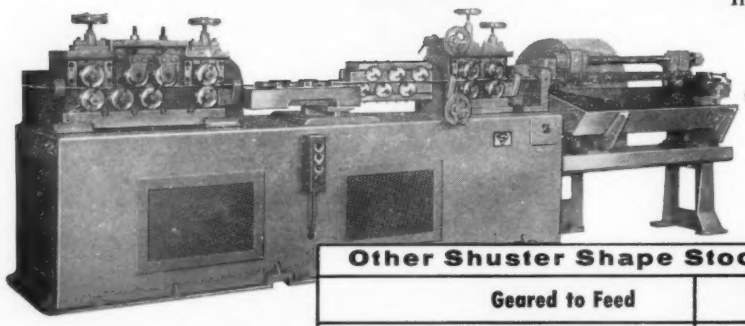
Shape Stock Straightening and Cutting Machine

Gives It To You Straight!

SHUSTER, the nation's oldest name in wire straightening and cutting, now offers a *complete* line of shape stock machines — first in the field again! For manufacturers of electric motors, wrought iron furniture, and wherever shape stock in volume is needed, SHUSTER offers the economical answer to accurate, straight, square cut stock.

3AVF

Capacity: to 3/8" square, or 3/4" width. Infinite variable speed drive — geared to feed *76* to *228* *feet per minute*. Solenoid operated roll-type clutch — electrically controlled cut-off.



Other Shuster Shape Stock Straighteners			
	Geared to Feed	Square	Max. Width
1AF	150 FPM	1/8"	1/4"
1AVF	50-200 FPM	1/8"	1/4"
2AF	125 FPM	3/16"	3/8"
2ABF	120 FPM	1/4"	5/8"

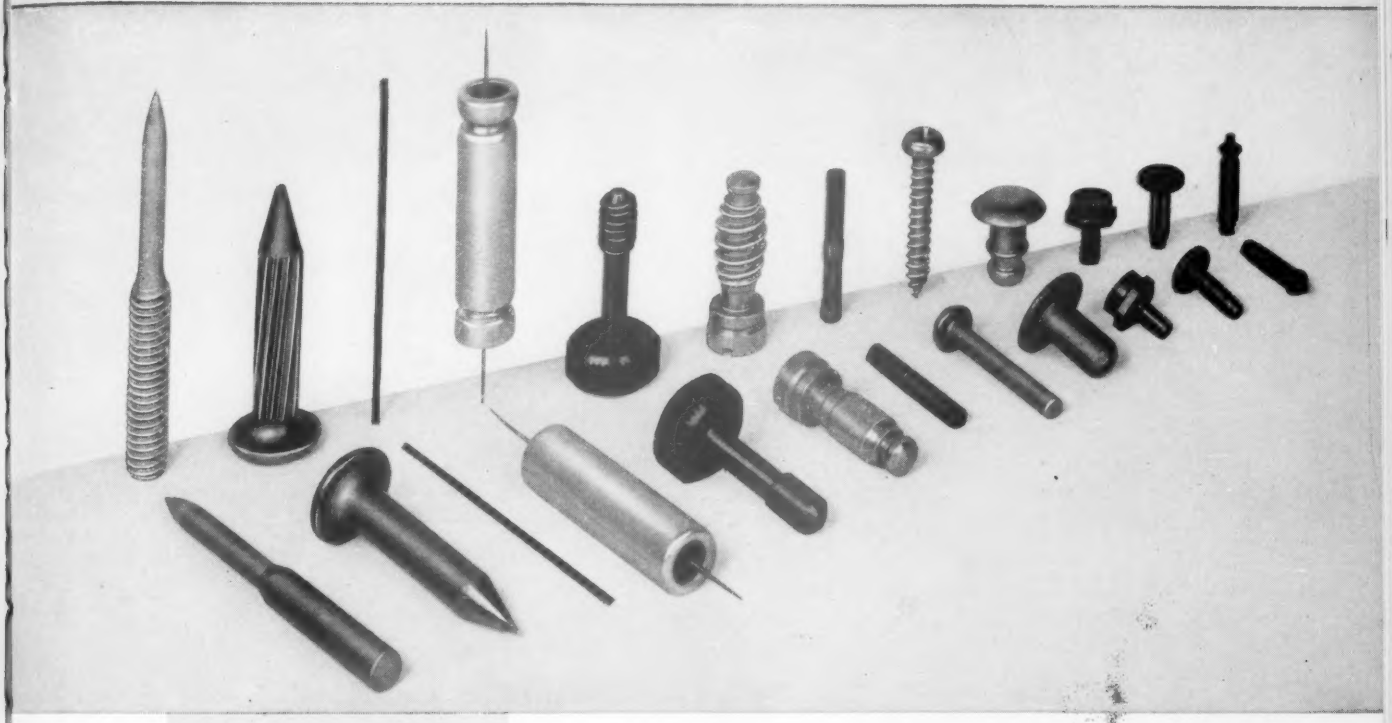
Write today for complete details!

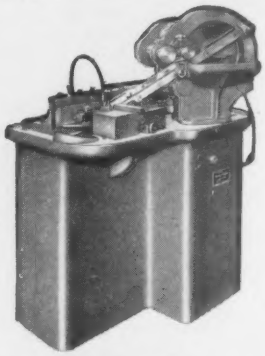
METTLER

MACHINE TOOL, INC.

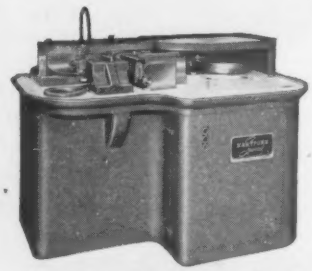
155 West Adeline Street, New Haven, Conn.

HARTFORD SPECIAL AUTOMATIC MACHINES COLD FORM 15,000 SMALL PARTS PER HOUR





MODEL A-190-R WITH ROTARY HOPPER



MANUAL MODEL A-312-M

Profitable short runs possible because of low initial cost, inexpensive dies and reduced setup time from job to job.

Accuracy of parts maintained through the life of the dies because of simplicity of design, rugged construction and vibration-free operation.

Hopper fed operation requires only an attendant to load and unload.

Compact size requires less than 4 x 6 feet of floor space.

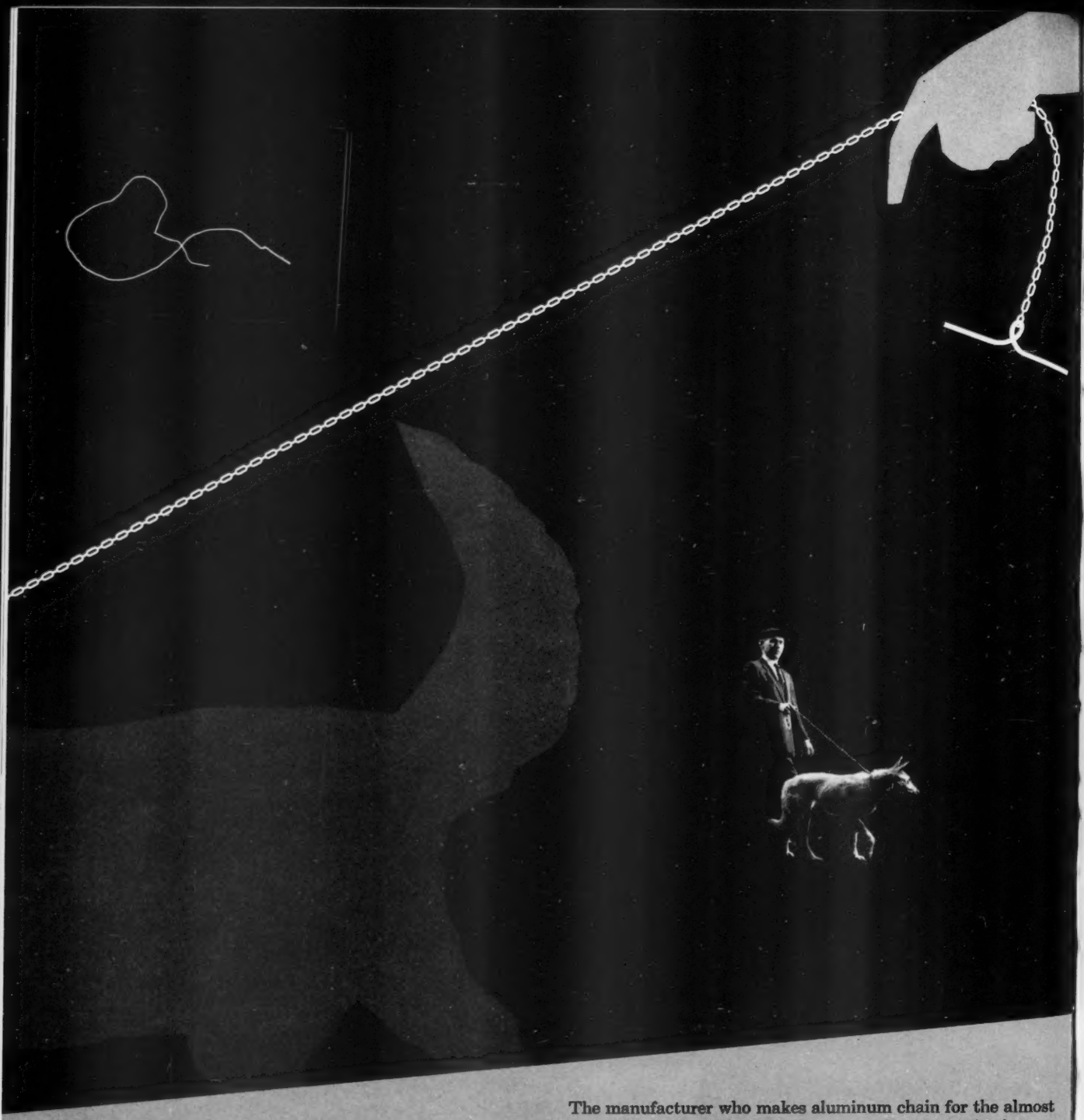
No special installation or electrical service required. Motors equipped with starting switch and automatic cutout for overload safety.

Handles ferrous and non-ferrous parts including brass, copper, magnesium, molybdenum, titanium, zirconium, powdered metals, aluminum, stainless steel, vitalium, plus bakelite and fibre.

Hartford also makes automatic Drilling and Tapping Machines, Machine Components, Special Machines and the world famous Super-Spacer.

HARTFORD Special

THE HARTFORD SPECIAL MACHINERY CO. • MACHINE TOOL ACCESSORIES DIVISION • 2527 HOMESTEAD AVE., HARTFORD 12, CONN.



a profitable idea!

The manufacturer who makes aluminum chain for the almost 50 million dogs and cats in the country is sure to win the business of millions of pet owners. A leash or "lead" of aluminum is light weight, rust-free, strong, and can be anodized in beautiful colors. No matter what your wire product, it will pay you to check into the advantages of aluminum.

Alcoa has set up a special department to work with you on profitable new ideas, new uses for aluminum wire. For immediate action, write ALUMINUM COMPANY OF AMERICA, Wire Products Development, 875-G Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM WIRE PRODUCTS

Your Guide to the Best in Aluminum Values

THE ALCOA HOUR • Television's Finest Live Drama • Alternate Sunday Even

New Fiberglas Pre-Saturated yarn is uniformly and completely saturated with asphalt throughout the package.

ANOTHER FIBERGLAS FIRST... A VASTLY IMPROVED YARN FOR WIRE AND CABLE

New Asphalt Pre-Saturated Fiberglas* yarn gives you:

- ***high braiding efficiency***
- ***outstanding adhesion of braids and wraps to outer finish***

Now available for braids on non-metallic sheathed building and service cables . . . for wraps on rubber-covered building wire.

This new Fiberglas Pre-Saturated yarn —type ECG 150 1/0 (one turn per inch) —is supplied on both twister tubes and braiding packages. It has been widely field tested and proved outstanding in building wire and cable applications. It is the only yarn of its type now commercially available.

For further information—or samples of Fiberglas Pre-Saturated yarn which you can test on your cables—write: Owens-Corning Fiberglas Corp., Dept. 217-G, 598 Madison Ave., New York 22, N.Y.

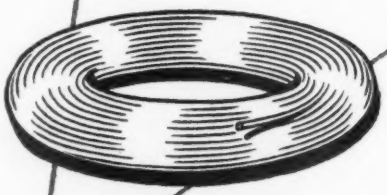
OWENS-CORNING FIBERGLAS

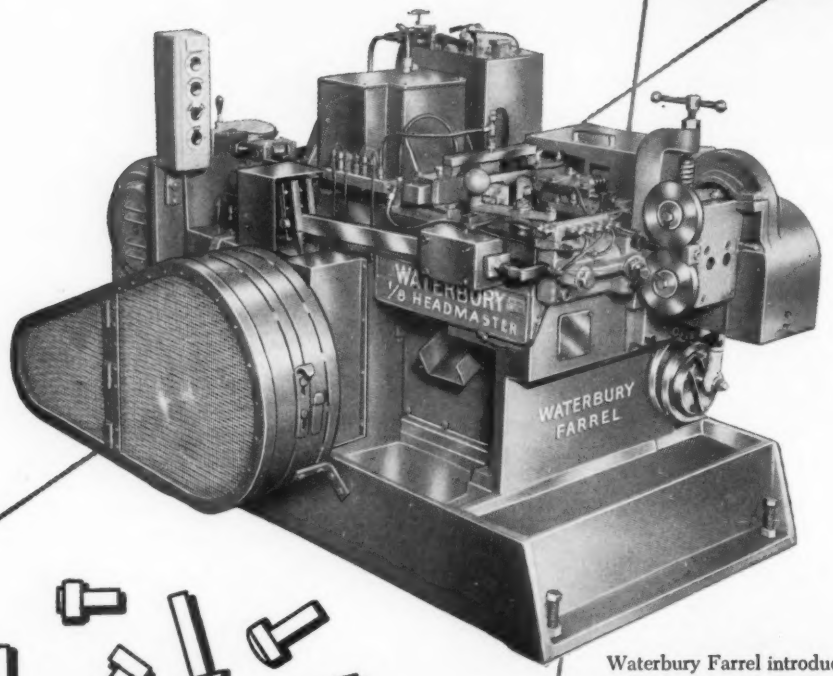
*T. M. (Reg. U. S. Pat. Off.) O.-C. F. Corp.

New! World's Fastest!

WATERBURY FARREL "HEADMASTER"

Heads 300 To 450 Screw Or Rivet Blanks Per Min.





Waterbury Farrel introduces a revolutionary new concept in cold heading speeds... proven by actual production runs to be the world's fastest rates achieved by a solid die double stroke header.

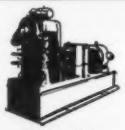
Operating at speeds from 300 to 450 blanks per minute, the machine will head rivets up to ⅛" x ¾, machine screws up to #6 x ¾, and sheet metal screws up to #8 x ¾.

Write today for further information on Waterbury Farrel's "HEADMASTER."

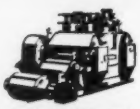
WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn., U.S.A.
Sales Offices:
Chicago • Cleveland • Millburn, N. J.

Bolt, Nut & Screw Machinery

Power Presses


Rolling Mill Machinery

Wire Mill Equipment


Sendzimir Mills and Other Special Machinery

WATERBURY FOUNDED 1851 FARREL

WF-33

Naugatuck NAUGAPOL

SPECIALLY-PROCESSED BUTADIENE-STYRENE POLYMERS

dry!

...like the Moon

The Moon is dry because it has no atmosphere. NAUGAPOL® polymers are dry–*and stay dry*–because they are free of moisture-absorbing salts.

Special processing does it...special processing that eliminates use of salts as the coagulant. Whatever grade you require–1016, 1018*, 1019*, 1021, 1022*, 1023, 1503* or 1504*–the name NAUGAPOL is your assurance of–

- **HIGH DIELECTRIC PROPERTIES**
- **LOW MOISTURE ABSORPTION**
- **LOW ASH CONTENT**

These are the qualities that make NAUGAPOL Polymers ideal for use in electrical wire and cable insulation and in mechanical rubber products requiring good flexibility at sub-freezing temperatures. If *you* require *special properties* in synthetic rubber, come to Naugatuck!

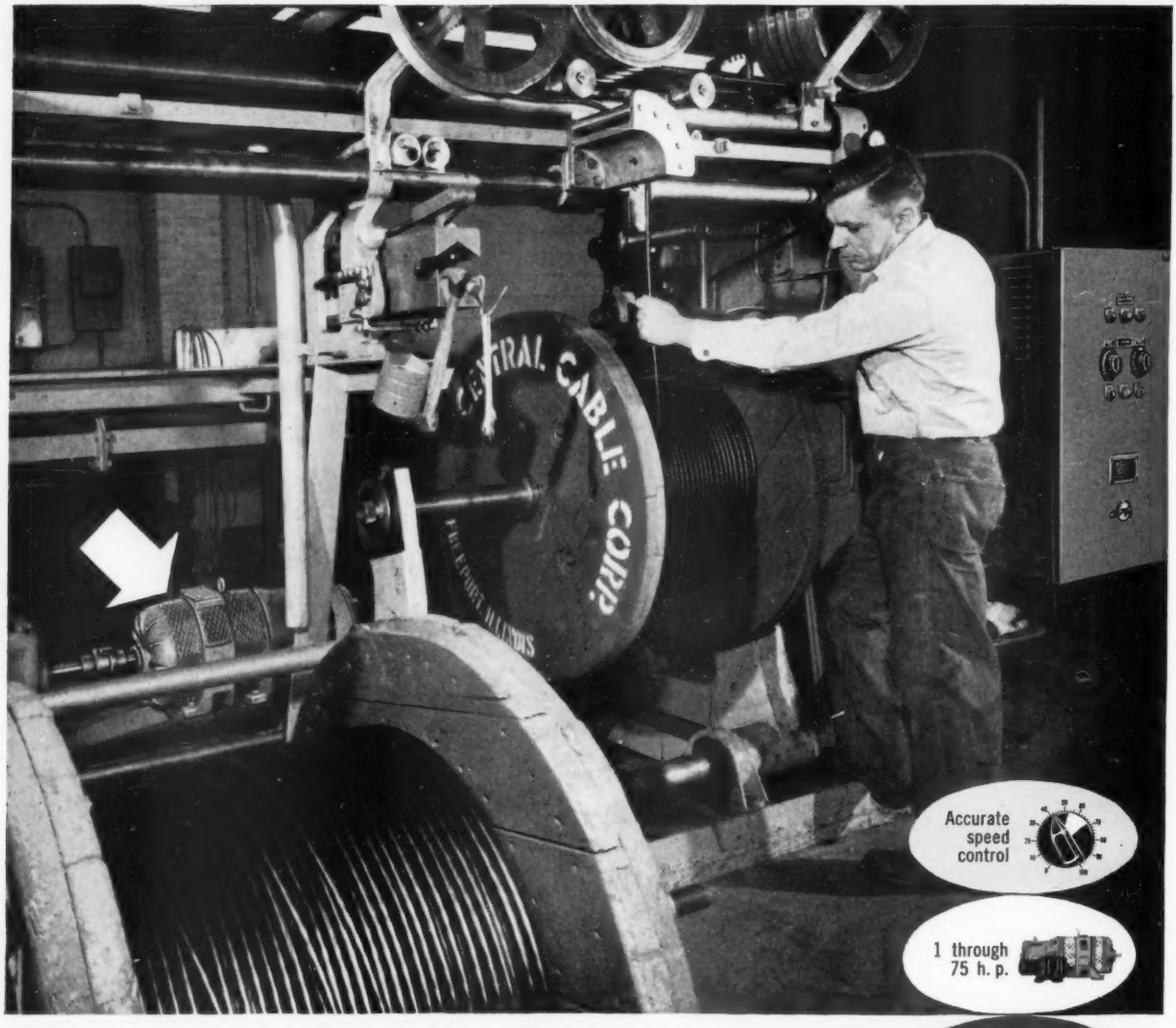
*Light-colored polymers stabilized with non-discoloring, non-staining POLYGARD®

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

US RUBBER

IN CANADA: NAUGATUCK CHEMICALS, Elmira, Ontario • Cable Address: Rubexport, N.Y.
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices



How to get higher wire production at lower cost:

Louis Allis provides dependable A. C. adjustable speed drives for wire lines

Here's a dependable tip for boosting production on any continuous extrusion line producing rubber or plastic insulated wire: Louis Allis Ajusto-Spede® can give you simple control of your wire-line process that will assure proper tension on the wire, plus correct relative speed of wire and plastic flow into the die at all times.

The result? Wire coated to a dimensional accuracy that will meet the most rigid specifications . . . produced with excellent uniformity at a high output rate, and with the minimum of scrap.

Louis Allis controls give you "one-dial" master speed control to assure proper synchronization between extruder, capstan, and take-up.

The proof lies in the many successful Louis Allis wire-processing installations. There's a Louis Allis sales engineer in your area who'll gladly give you their names, and who can give you expert advice on the correct drives for powering *your* wire line.

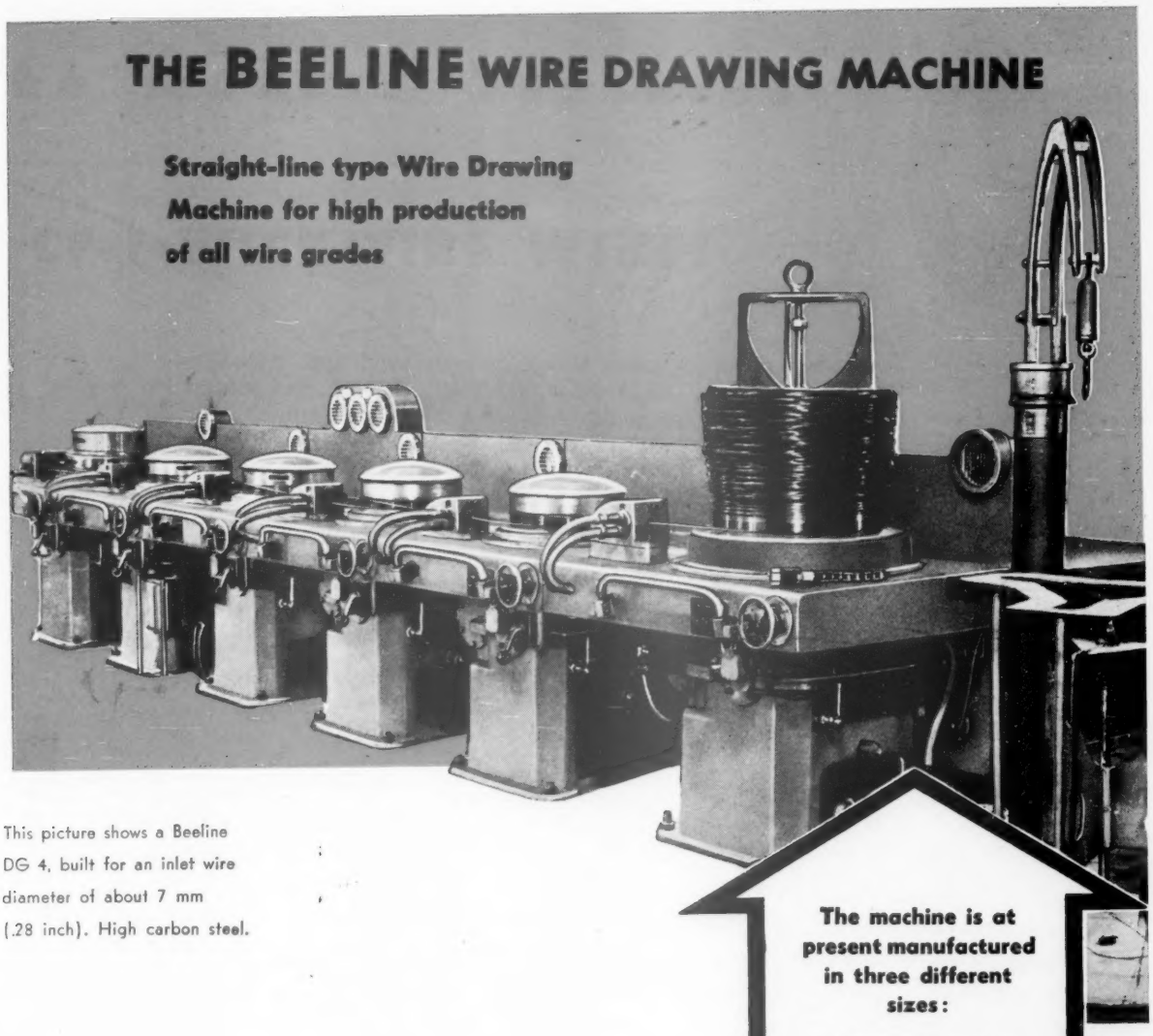
Contact your nearby Louis Allis District Office or write The Louis Allis Co., 451 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades



This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (.28 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5

for heavy wire, about 13 mm. (.500 inch)

BEELINE DG 4

for wire rods, about 7 mm. (.28 inch)

BEELINE DM 3

for wire with an inlet diameter of about 3 mm. (.116 inch)

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100

the modern bee uses

CF&I-WICKWIRE WIRE!

Modern bees have stopped storing honey in handy hollow trees. Instead, they choose man-made hives—hives which are neatly divided by wood and special round, tinned, hard drawn, low carbon CF&I-Wickwire Bee Wire.

Chances are you don't need wire to make bee hives. But *you may need one or more of the nearly 100 different categories of specialty wire for which CF&I-Wickwire is famous.* Let us show you how we can meet your most rigid chemical and physical specifications on high and low carbon wire in all sizes, shapes, tempers, finishes and grades.

Check This List!

FOR THE WIRE YOU REQUIRE, SEE CF&I-WICKWIRE.

FLAT AND SHAPED WIRES
Armor Wire
Bobby Pin Wire
Bookbinder Wire
Brush Wire
Casing Wire
Cotter Pin Wire
Curtain Spring Wire
Die Spring Wire
Gutter Broom Wire
Lock Spring Steel
Rake Tine Steel
Regulator Spring Wire
Snake Fishing Steel
Stapling Wire for Preformed Staples (Flat)

LOW CARBON FINE AND SPECIALTY WIRE
Bee Wire
Bonnet Wire
Bookbinder Wire
Broom Wire
Clip Wire
Dent Spacer Wire
Drapery Pin Wire
Florist Wire
Fuse Wire
Glass Netting Wire
Hairpin Wire
Hook and Eye Wire
Mattress Wire
Picture Cord Wire
Picker Tooth Wire
Pin Ticket Wire
Pin Wire
Ring Traveller Wire
Spiral Binding Wire
Stapling Wire
Stapling Wire for Preformed Staples
Stone Wire
Weaving Wire
Weaving Wire for Fly Screen Cloth
Wissco Iron Wire

HIGH CARBON FINE AND SPECIALTY WIRE
Aircraft Cord Wire
Armor Wire
Belt Hook Wire
Bobbin Ring Wire
Brush Wire (Tempered and Untempered)
Brush Wire (High Strain)
Chrome Vanadium Spring Wire
Core Wire (Aluminum Cable Steel Reinforced)
Curtain Spring Wire
Flexible Shaft Wire
"Gamma" Spring Wire (Upholstery Spring Wire)
Zig Zag Wire
No-Sag Wire
Hat Wire
Heddle Wire
Hose Reinforcement Wire
Hose Wire, Mechanical
Hose Wire, Vacuum and Defroster
Rope Wire
Signal Corps Wire
Spoke Wire
Hard Drawn Spring Wire
Oil Tempered Wire
Spheroidized or Annealed Spring Wire
Tire Bead Wire
Valve Spring Wire

MANUFACTURERS LOW CARBON COARSE WIRE
Bag Tie Wire
Basket Handle Wire
Box Binding Wire
Brush Handle Wire
"Cal-Tie" Wire
Can Key Wire
Case Hardened Ball Wire
Chain Wire
Clamp Wire
Clothes Pin Wire
Concrete Wall Reinforcement Wire
Garment Hanger Wire
Hay Baling Wire (Coiled)
Lingo Wire
Lintel Wire
Loop Wire
Merchant Quality Wire
Pail Bail Wire
Rivet Wire
Stapling Wire
Strand Wire
Tying Wire
Welding Wire
Wissco Iron Wire
Industrial Quality Wire
Cold Rolling Quality Wire
Heading, Forging or Roll Threading Quality Wire
Medium High Carbon Wire

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix Pueblo • Salt Lake City • Wichita • PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland San Francisco • Seattle • Spokane • WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago Detroit • New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Montreal • Toronto
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

Performance that pays . . . in Drawing E.C. and Alloy Aluminum

Here is a drawing team that wins new friends in the Aluminum Wire Drawing Field every day; the 18-T Rod Breakdown Machine and Model DFH Spooler.

This Machine operates at high efficiency up to 5000 F.P.M.

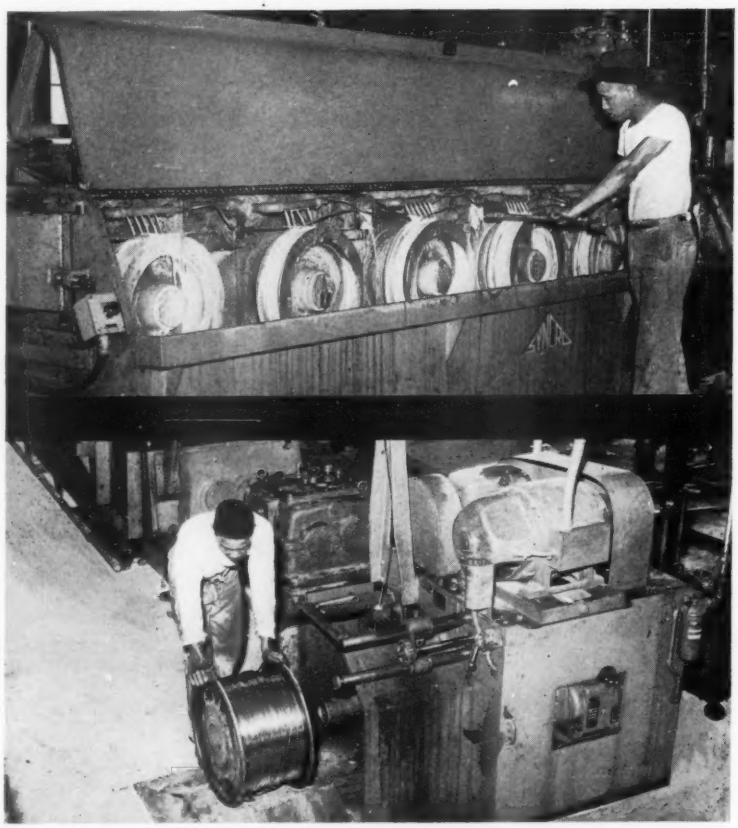
IT FEATURES

- √ **fully adjustable die holders**
- √ **anti-friction bearings**
- √ **draw blocks with long wearing replaceable surfaces**
- √ **forced feed lubrication system**

Tandem's teammate, the DFH Spooler, has capacity for accommodating reels up to maximum 30″ flange diameter.

For paying performance—SEE SYNCRO FIRST.

Pictures show 3/8″ 56S Aluminum Alloy Rod drawn to finish dimension of .182″.



Pictures through the courtesy of Kagan-Dixson Wire Corporation, Rahway, N. J.

SYNCRO®

SYNCRO MACHINE COMPANY

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

Better Machinery for the Wire Industry

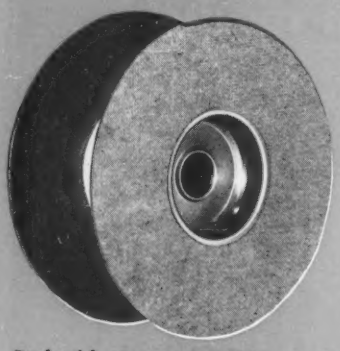
WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

HUBBARD HAS IT

If it's a spool or reel, HUBBARD makes it.

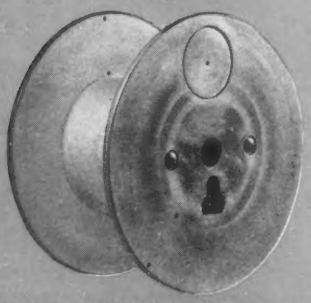
Every type: Wood - Steel - Plywood - Masonite - Cardboard - Aluminum.

HUBBARD is headquarters for any reel or spool requirement.



Reel with a masonite flange and cardboard hub assembled with steel end washers for domestic and export shipment of wire, tape, braid or other materials.

Heavy Duty Precision Brazed Steel Spool for drawing and processing of wire. Strongly and accurately made for long service.



Non-Returnable Magnet Wire Shipping Reels designed for high-speed wire take-off. Light in weight, low in cost, high in impact and tensile strength. Ideal for palletized shipments.

PLYWOOD MARRIES STEEL

FOR BETTER SHOP REELS RESULTING IN

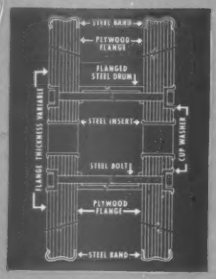
1 GREATER IMPACT STRENGTH

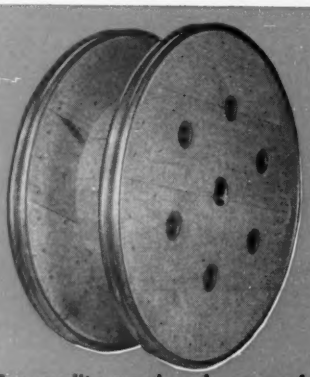
2 LOWER MAINTENANCE COSTS

3 LIGHTER WEIGHT FOR EASIER HANDLING

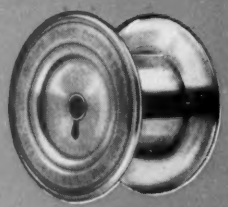
4 ABILITY TO WITHSTAND SUBMERGENCE IN WATER

5 WIDE RANGE OF SIZES





Top quality wood reels armored with galvanized steel for minimum strength and long hard service.



Aluminum Reels designed for customers' appeal. Heads are strong. All welded construction. Smooth surfaces. Tare weight uniform. Ideal for bulk shipping.

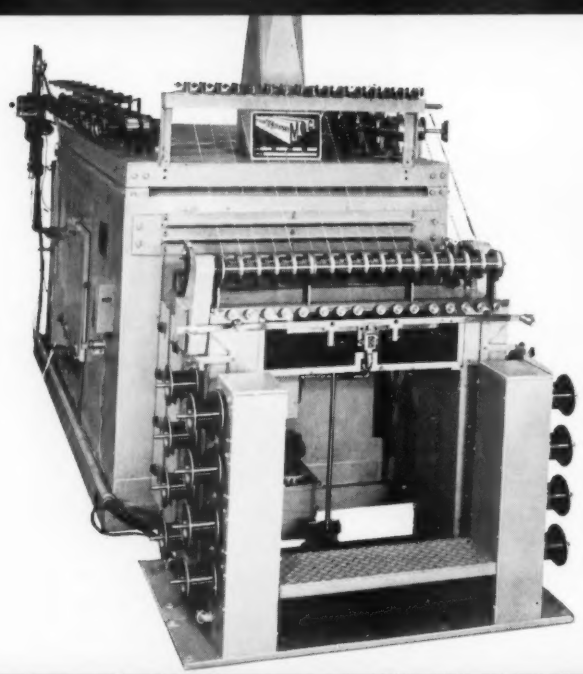
Reel with plywood flange and galvanized steel hub assembled with tubular rivets and special washers for heavier loads.

Steel Shipping Containers. Wire Pak pails featuring top and bottom support for inner core. Smooth seams throughout. Tops available with lug or ring seals. Have salvage value.

HUBBARD
SPOOL CO.
GARRETT, INDIANA

EXPERIENCE:

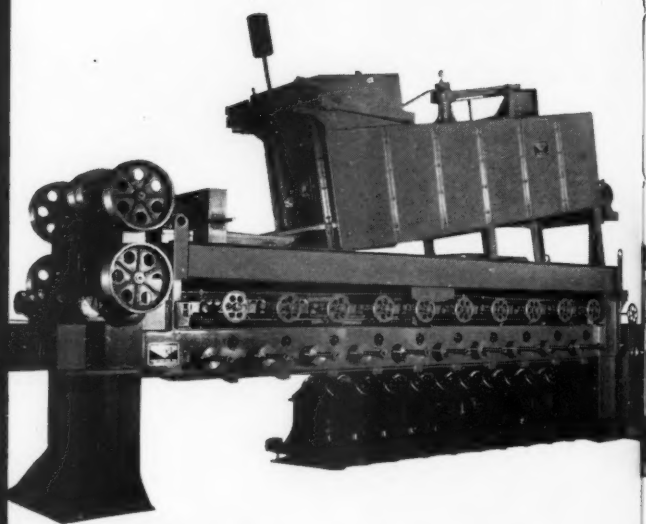
Twelve years of development in gas-fired equipment — Three years of "on-the-job" production results



WIRE ENAMELING MACHINES

Typical of the complete line is this type "B" machine which handles wire from 31 A.W.G. to 42 A.W.G.

Five other models complete the range from the finest through large rectangles. The horizontal, high volumetric, recirculating double-pass oven allows greatly increased production by rapid heat impartation and a high degree of temperature uniformity throughout the wire chamber. Other features include: a catalyst within the recirculating stream consumes solvents and releases heat energy, individual clutches in each head of the wire capstan, automatic braking device controlling wire tension.



CONTINUOUS BRIGHT ANNEALERS

This is the first direct gas-fired annealer using the heating equipment as an internal inert atmosphere generator. Advanced mixing and burning equipments are utilized which exclude the need for external sources of steam or costly inert atmospheres. They are available in horizontal or vertical mounting positions. MOCO Annealers are of the high volumetric recirculating type with automatic air-fuel gas ration maintained over the entire range. They have a water sealed exit. No external source of inert atmosphere is needed.

WIRE ENAMELING DIVISION

MICHIGAN OVEN COMPANY

425 Brainard • Detroit 1, Michigan

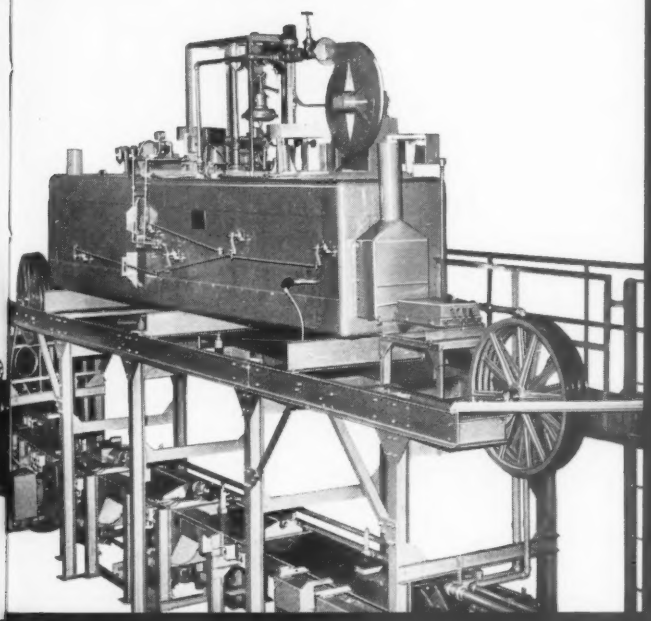
Proof that experience is your guarantee of maximum production at a savings in wire enameling equipment

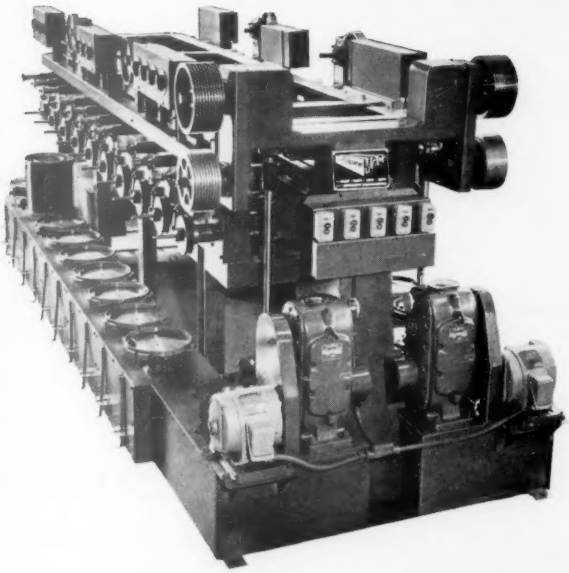
Over twelve years ago, MOCO began its engineering experiments in the development of high volume recirculating wire enameling machines and complimentary equipment – both gas fired and electrically heated.

Using principles highly successful in other fields of heat processing, MOCO aimed for – and attained – a line of wire machinery far superior to equipment presently on the market.

After complete testing in company-owned installations, the first ovens were installed by some of the leading wire manufacturers over three years ago. Reports have been unanimous. MOCO-engineered wire equipment – utilizing modern recirculating oven features combined with the latest wire handling and coating machinery – have changed the standards of the industry.

Here are just a few of the advanced features made possible by MOCO wire equipment:





GLASS INSULATING MACHINES

This MOCO machine is capable of applying two servings of glass or yarn and four coats of baked insulating varnish simultaneously. It turns out large quantities of heavy rounds and rectangulars (up to 150 M. Sq. Cross Sectional Area). MOCO's revolutionary Rapid-Cool Oven lets you stop production without damage to wire in the oven. Return to full production in a matter of seconds because of the rapid rise of the temperature inside the oven.

REEL-R-DRUM PACKERS

This is the first machine to allow you to take-up on either a spool or pail pack. It has a speed range from 20 to 120 feet per minute. You can produce two wire sizes simultaneously through the same process at different speeds. Handling wire sizes ranging from .008″ to .025″ in diameter, this MOCO Reel-R-Drum packages annealed copper magnet wire on different reels or in nominal 100 lb. capacity Payoffpak Drums, or both, simultaneously.

OTHER ENGINEERING ACHIEVEMENT BY

MOCO

More Details on these ven Features and ny Others Fill in this Handy Coupon

Please send me complete information on the many outstanding MOCO features:

☐ Wire Enameling Machines ☐ Annealers

☐ Glass Insulating Ovens ☐ Reel-R-Drum Packers

NAME_____ TITLE_____

COMPANY_____ ADDRESS_____

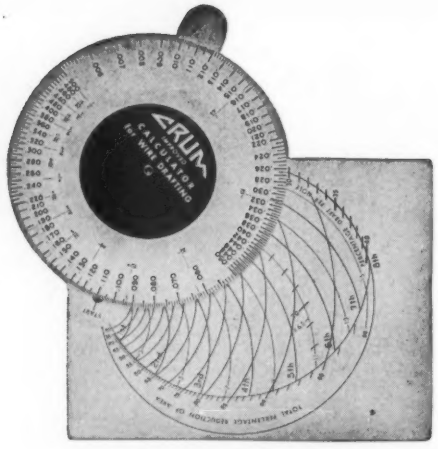
CITY_____ ZONE_____ STATE_____

SAVE SET-UP TIME WITH THE . . .

CRUM CALCULATOR

FOR WIRE DRAFTING

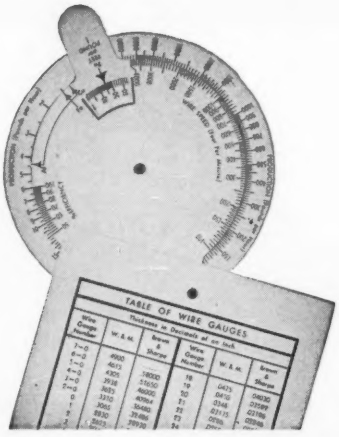
Useful and Accurate!



Front view of Crum Calculator.

THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.



Reverse view of Crum Calculator.

SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.

THE PRICE: $5.00 EACH

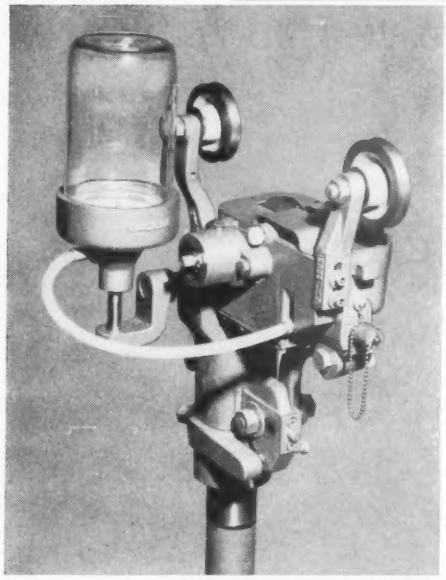
Send your orders to:

WIRE AND WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

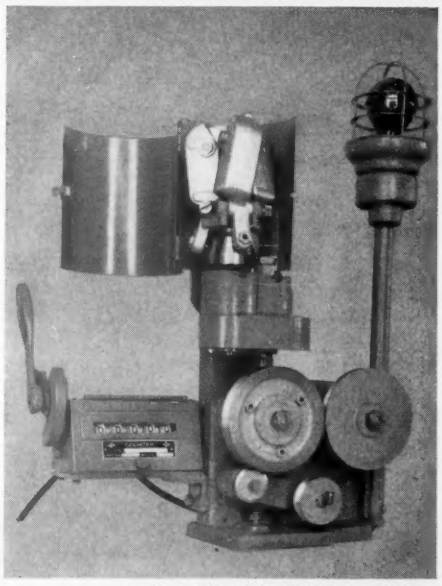
(Exclusive distributors)

NOW — MARKING MACHINES, WHEELS, TYPE STRIPS, INKS



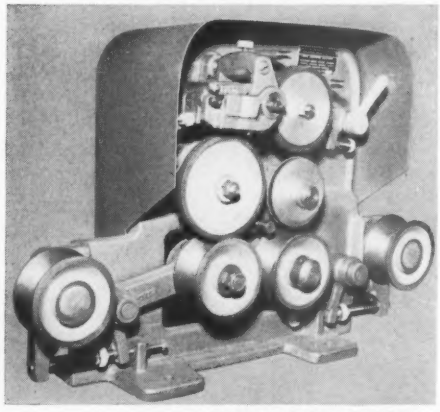
TYPE F WIRE MARKER

AVAILABLE FROM ONE SOURCE



TYPE G SPIRAL MARKING MACHINE

ENTWISTLE OFFERS COMPLETE RANGE OF MARKING DEVICES TO INDIVIDUAL SPECIFICATIONS FOR BOTH RUBBER AND THERMOPLASTIC INSULATION



TYPE A-2 WIRE MARKER

WHEELS — TYPE STRIPS

By making all marking machines and supplies available from one source, Entwistle helps simplify your ordering, makes it easier, speeds delivery. Machines can be ordered to meet your specific production problems and requirements. Printing size marks, codes, trademarks, etc. or spiral striping of wire can be done without slowing production.

TYPE F WIRE MARKER Prints or stripes on plastic wire using only one revolving printing member. Prints at extruder wire speed, eliminates re-reeling for printing.

TYPE G SPIRAL MARKING MACHINE Spiral stripes up to three different colors simultaneously. Rotated by passage of wire. Capacity from 3/64 to .20 inches wire diameter. Capacity to 5/16″ diameter can also be provided.

TYPE A-2 WIRE MARKER Prints or stripes wire and tubing. Operated by movement of wire. Prints in one color. Type strip legend made to your requirements. They provide trouble-free operation and are readily interchangeable.

WHEELS — TYPE STRIPS Marking wheels are of chrome plated steel. Each is etched to customer's specifications. Inexpensive, economical type strips are of durable rubber bonded to a flexible steel band.

WIRE MARKING INKS Permanent, scuff-proof, resistant-proof. Will pass all present abrasion and solvent resistance tests. Available in all seven standard colors. Mixed to match your specific shades at no extra cost.

For complete details on inks and machines above, write or phone direct.

ENTWISTLE
Manufacturing Corporation
1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

the problem: *how to produce* BUNCHED WIRE *with the smooth concentric qualities of stranded wire in a limited floor area?*

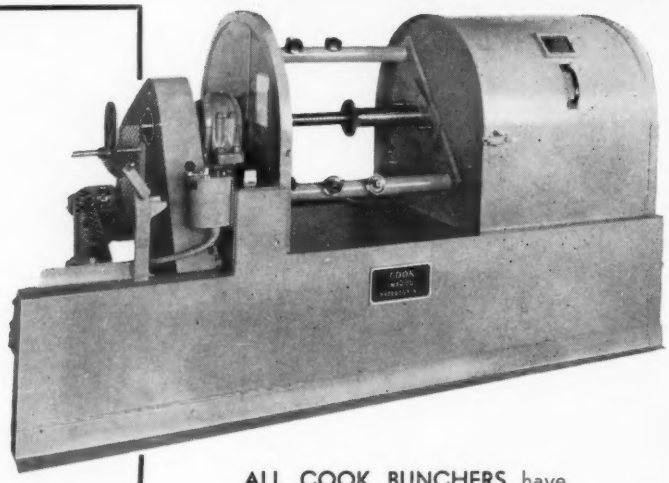
the solution: *install a* COOK BUNCHER *with these features:*

HIGH SPEED

SINGLE TWIST FLYER

AUTOMATIC LAY CONTROL

LARGE TAKE-UP REEL



• *See Specification Chart below for the COOK BUNCHER most suited to your requirements.*

ALL COOK BUNCHERS have successfully formed bunched strands of 7, 10, 16, 19, 26, 41 and 65 wires with such concentricity as to enable its passage through an extruding die of only 1 mil clearance. In addition, such constructions as 27/36 and 41/36 have been bunched at high speed with perfect concentricity on these versatile machines.

• CABLERS MODELS AVAILABLE IN SIZES UP TO AND INCLUDING REEL DIAMETERS OF 48 INCHES

COOK MANUFACTURING COMPANY has a complete line of BUNCHING EQUIPMENT to accommodate the following reel sizes.

Model	Size	Capacity
B-H-8	8" x 6"	45 lbs.
B-H-12	12" x 8½"	90 lbs.
B-H-16	16" x 8½"	200 lbs.
B-H-21	21" x 8½"	350 lbs.
B-H-22	22" x 11"	500 lbs.
B-H-24	24" x 10½"	1000 lbs.

Capacity Based on Solid Copper Wire

• Our Engineering Dept. is at your service to assist you in the solution of your wire problems—at no obligation of course.

A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK MANUFACTURING CO.

50 EAST 25TH STREET, PATERSON, N. J. • ARMORY 4-6380

CANADIAN AGENT:
E. V. LARSON CO., LTD.
TORONTO CANADA

EUROPEAN AGENT:
CAPAMADJIAN LE MONNIER CIE LTD.
PARIS FRANCE

This lightweight "No Charge" spool is typical of Roebling's modern packaging methods that save customers time and money.

Are You Getting What You Pay For?

When you pay for HIGH QUALITY high-carbon wire, you want to be sure you get it. You do, when it is supplied by Roebling.

It is unsurpassed in quality, consistently true to specifications, and absolutely uniform in gauge. Hundreds of manufacturers attest to this fact . . . the qualities that they *pay* for—they *get* in Roebling high-carbon wire. The length of our relationship with customers proves it.

We'll be glad to show you what we mean. For information on superior high-carbon wire or cold rolled strip, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities—Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

Check These Features of

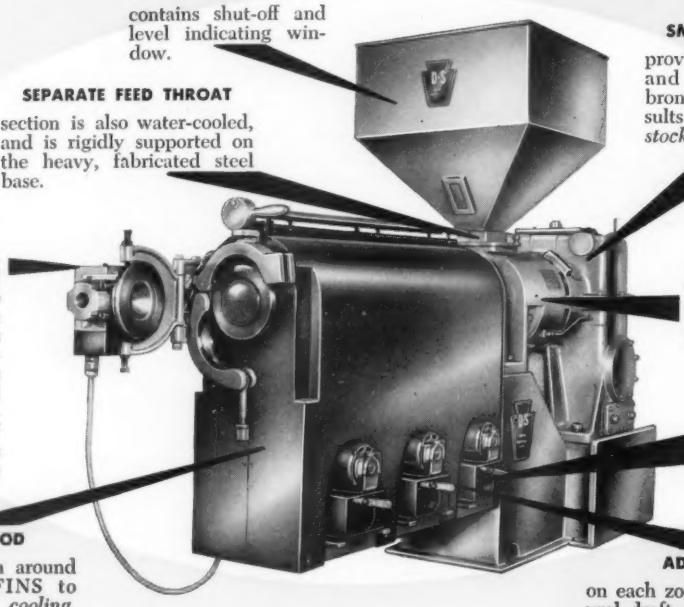
THERMA-FIN EXTRUDERS*

FEED HOPPER
contains shut-off and level indicating window.

SEPARATE FEED THROAT
section is also water-cooled, and is rigidly supported on the heavy, fabricated steel base.

"STREAM-FLO" CROSSHEAD
has quick opening clamp, and is hinged to facilitate quick servicing. This electrically heated crosshead has been designed so that a minimum amount of compound is carried in the head.

BLOWER HOOD
deflects air stream around the THERMA-FINS to provide *uniform cooling.* Hood contains an inner stainless steel liner insulated from the outer cover.



SMOOTH FLOW OF POWER
provided by hardened worm and special high capacity bronze worm wheel drive results in *steady, non-pulsating stock screw drive.*

THRUST HOUSING
section is water-cooled, and contains a rugged steel thrust sleeve that is supported on heavy-duty roller thrust and radial bearings.

BLOWER
of large capacity cools each heat zone. Temperature of each heat zone is controlled independently.

ADJUSTABLE DAMPER
on each zone controls amount of natural draft or blower capacity. Closed oven effect is created by closing dampers and shutting blowers off.

OTHER OUTSTANDING FEATURES:

● **DAVIS-STANDARD® THERMA-FINS,** which clamp over the cylinder in each zone, are deep-finned, aluminum castings with cast-in calrod range type heaters of ample capacity.

● **STOCK SCREW** of constant lead and diminishing depth is made of special alloy steel. Flights are hardened, and entire polished surface is protected by hard chrome plate. Water cooling fixture is provided for hollow screw.

● **PROPORTIONING TYPE INSTRUMENTS** automatically maintain accurate temperature control.

● **SHOCK-MOUNTED CABINET** houses temperature control instruments and the blower control switches.

● **STANDARD AND SUPER MODELS** available in 1½", 2", 2½", 3¼", 4½", and 6" bore sizes.

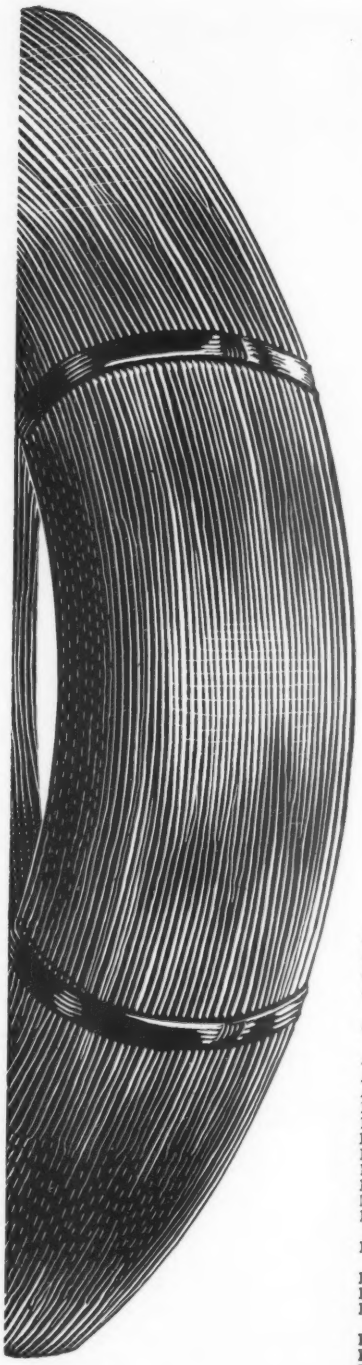
* U. S. Patents Pending

DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

12 WATER STREET, MYSTIC, CONNECTICUT

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES, LTD., BIRMINGHAM, ENGLAND



209 DIFFERENT KINDS OF WIRE

. . . *and Youngstown Makes Them All*

No matter what type wire you require, Youngstown should be your specification for high quality, uniformity and dependability. That's because they are all drawn from specially refined open-hearth carbon steels to meet your most exacting specifications.

Every grade of Youngstown Wire is rigidly quality-controlled in all steps of its production from ore mining to finish drawing and coating. This guarantees you a uniform product—both chemically and physically—that's free from injurious seams and piping, laps, die marks, as well as internal tearing and cupping.

Why not study this listing—it may suggest new products you could make from Youngstown Wire to boost both your sales volume and profits.

For additional information or metallurgical assistance, write or phone today to your nearest Youngstown District Sales Office.

QUALITY · YOUNGSTOWN · SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

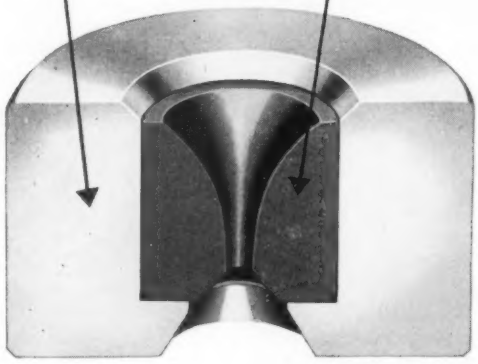
General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

Aircraft Wire
Alloy Wire
Annealed Wires
Armor Wire: Armoring Wire
Artificial Flower Wire
Automotive Wire
Awl Wire
Axle Wire
Bail Wire
Bale Tie Wire
Baling Wire
Ball Pin Wire
Basic Wire
Basket Handle Wire
Bed Rods
Bessemer Spring Wire
Bicycle Chain Stud Stock
Bicycle Spoke Wire
Binding Wire
Bolt and Rivet Wire
Bond Wire
Bonnet Wire
Bookbinder Wire
Border Wire
Bottle Handle Wire
Bottling Wire
Box Binding Wire
Box Hinge Wire
Brace Wire
Brick Cutting Wire
Bright Wire
Broom Wire
Brush Wire
Buckle Wire
Bundling Wire
Button Hook Wire
Cable Armor Wire
Can Key Wire
Cap Screw Wire
Car Heater Wire
Car Seat Wire
Card Wire
Cast Steel Wire
Ceiling Hook Wire
Chain Welding Wire
Chain Wire
Chair Rods
Chair Wire
Channel Bead Wire
Channel Pin Wire
Check Rower Wire
Clasp Wire
Clip Wire
Clothes Line Wire
Clothes Pin Wire
Coat Hanger Wire
Coat and Hat Hook Wire
Coiled Spring Wire
Cold Heading Wire
Concrete Reinforcement Wire
Copper Bearing Wire
Coppered Wire
Core Wire (A.C.S.R.)
Cork Screw Wire
Cotter Pin Wire
Crimping Wire
Croquet Arch Wire
Curry Comb Wire
Curtain Rods
Damper Rods
Double Clinch Wire
Dowel Wire
Duck Bill Nail Wire
Eave Trough Hanger Wire
Edge Wire
Elevator Hoisting Cable Wire
Fence Wire
Ferrule Wire
Fine size Wire
Firing Pin Wire
Fish and Leader Wire
Flesh Fork Wire
Flexible Shaft Wire
Florist Wire
Foundry Core Wire
Frame Wire
Fruit Jar Wire
Fuse Wire
Galvanized Wire
Galvanized Armor Cable Wire
Galvanized Brace Wire
Garment Hanger Wire
Gate Hook Wire
Grape Tie Wire
Grass Catcher Wire
Guard Wire
Gun Wrapping Wire
Hairpin Wire
Handle Wire
Harness Snap Wire
Hat and Coat Hook Wire
Hat Rods
Head Lining Wire
High Carbon Wire
Hog Ring Wire
Hook and Eye Wire
Hoop Wire
Hose Binding Wire
Husking Pin Wire
Key Wire
Key Ring Wire
Key Stock
Keystone Wire
Lacing Wire
Lantern Wire
Lathing Wire
Link Wire
Lintel Wire
Lock Washer
Loop Wire
Machinery Wire
Machine Screw Stock
Manufacturers' Wire
Market Wire
Mat Border Rods
Mat Wire
Mattress Wire
Metal Stitching Wire
Muzzle Wire
Nail Head Wire
Nail Wire
Neck Wire
Neck Yoke Ring Wire
Netting Wire
Nickel Steel Wire
Non-corrosive Wire
Nut Cracker Wire
No-Sag Spring Wire
Oval Wire
Oven Rack Wire
Pail Bail Wire
Pail Rim Wire
Piano Rods
Pin Wire
Pinion Wire
Pivot Wire
Pipe Winding Wire
Plow Steel Wire
Plunger Wire
Pneumatic Tire Bead Wire
Pot Chain Wire
Poultry Netting Wire
Pump Chain Wire
Rake Tooth Wire
Refrigerator Shelf Wire
Reinforcement Wire
Riveting Wire
Rivet Rods
Rivet Wire
Rock Fastener Wire
Roll Threading Wire
Rope Wire
Saddle Spring Wire
Sash Cord Wire
Scrapless Nut Wire
Scratch Brush Wire
Screen Wire
Screw Wire
Screw Driver Wire
Screw Rod Wire
Shade Roller Wire
Shelf Wire
Skid Chain Wire
Smooth Wire
Snare Wire
Soft Processed Wire
Spark Plug Wire
Spiral Hooping
Spoke Wire
Spring Wire
Stapling Wire
Stitching Wire
Stone Wire
Stove Bolt Wire
Stove Pipe Wire
Stove Rods
Straightened & Cut Wire
Strapping Wire
Stud Stock
Surveyors' Chain Wire
Tack Wire
Tag Wire
Tie Wire
Tire Bead Wire
Towel Rods
Toy Wire
Trap Spring Wire
Transom Rods
Trellis Wire
Tuning Pin Wire
Tying Wire
Umbrella Wire
Wash Boiler Wire
Weaving Wire
Welding Wire
Whip Guard Wire
Wood Screw Wire
Wrapping Wire
Zig Zag Spring Wire

NEW HEAT-TREATED,
COLD-DRAWN CASINGS

SAME HIGH-QUALITY
CARBIDE DIE NIBS



NEW LOWER PRICES

SAVE 20% ON THIS R-10 DIE. And make similar savings on other Carboloy dies, mandrels, and nibs. Get improved casings, same high-quality carbide.

NEW MANUFACTURING PROCESS BRINGS REDUCED PRICES ON CARBOLOY® DIES

All Carboloy wire dies are now made on a new mechanized manufacturing line. As a direct result of this mechanization, prices of all round-hole dies have been reduced approximately 20%.

The carbide in these dies is the same tough, wear-resistant grade that has set record after record in mills throughout the country. But the carbide is now encased by a new technique in heat-treated, cold-drawn steel that is of consistently high quality.

The savings created by mechanization have been passed along to you. Price reductions on Carboloy cemented carbide round-, square-, and hex-shape dies will bring you substantial savings. And standard header die nibs, mandrels, and nail gripper nibs carry even greater reductions.

These savings are more proof that our continuing program of product and process improvement is paying off for our customers in lower manufacturing costs. For your copy of the new Price List D-138 on standard Carboloy dies, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Road, Detroit 32, Michigan.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

FORMVAR® . . .
for a balance of properties

You get more for your magnet wire dollar when you buy wire coated with FORMVAR phenolic enamel. You get a balance of mechanical, electrical and chemical properties unequalled in the industry . . . plus more than 15 years of proven performance as the industry standard. That's why FORMVAR phenolic enamel is used on more than 70% of all magnet wire.

FORMVAR phenolic enamelled wire possesses excellent wet and dry dielectric properties, exceptional adherence, flexibility and elongation, and outstanding resistance to heat shock, abrasion, solvents, acids and bases.

FORMVAR is the registered trademark for polyvinyl formal produced and sold only by Shawinigan Resins Corporation. When combined with an alkyl phenolic resin it becomes that tough, heat resistant wire enamel you may know as FORMVAR enamel.

If you want an insulation which will permit trouble-free service, lower maintenance and production costs, and greater efficiency, look to FORMVAR. Shawinigan's exacting production controls and active applications research keep FORMVAR a uniform and dependable ingredient for magnet wire enamels. Shawinigan Resins Corporation, Department 5307, Springfield 1, Mass.

FORMVAR® polyvinyl formal

for wire enamels by

SHAWINIGAN RESINS®

WIRE and WIRE PRODUCTS

reaches many prospects

YOUR SALESMEN DON'T KNOW!

No matter how big you are, the odds are you don't know all your actual prospective customers. Advertising in Wire and Wire Products will carry your sales story to them.

If your company is small, it is even more important to be "calling" on your prospects and customers regularly through advertising. It pays out handsomely.

Your advertising in Wire and Wire Products will be seen by many people in the plants you wish to "sell" whom your salesmen never would see, yet who specify, actually buy or who influence decisions on products to be purchased. Your advertising is bound to be of immeasurable value to you, too, in paving the way for a good reception for your salesmen when they do call. And the field's buying power is tremendous!

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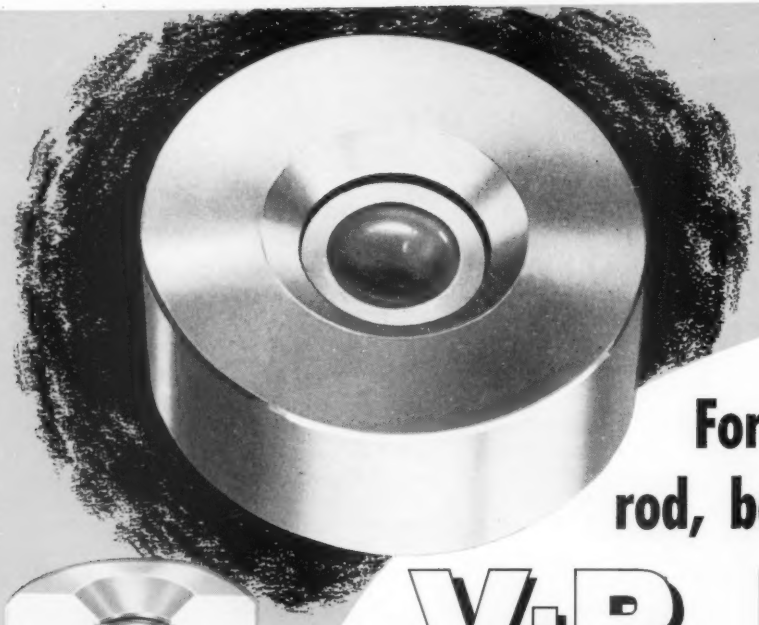

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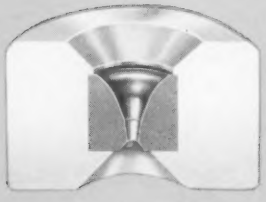

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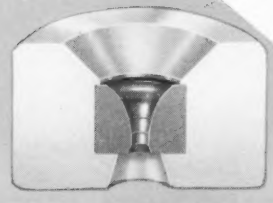

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The Wire Outlook

The "boom" of the last couple of years has settled down to an even pace, even though there are trouble spots here and there. The Department of Commerce, based on activity through the first four months compared with the closing months of 1956, states that business is strong.

Spending, from a dollar standpoint, keeps moving up, but much of the increase is due to higher prices and not to units sold. Optimism for the future is rising.

Industries supplying business with production equipment are still expanding output. Aircraft, railroads and ship production has risen sharply. Trucks and farm machinery output is somewhat down, as is automotive passenger car production. Machine tool production, increasing steadily for the last two years, has leveled off. Household appliances, including TV sets, have had production cut backs. Some types, like air conditioners, are expanding in both output and sales.

Capital investments in new plants and equipment, however, are continuing active and may be considered an important mainstay to business prosperity.

It should be stated, too, that while personal spending has increased, liquid savings by individuals have also risen. Savings accounts in banks are 4.5 billions higher than last year and in building and loan associations are up over 5 billions. An increase in the purchase of corporate securities has been noted, the total standing around 335 billions. Against this, liabilities of individuals are only 126 billions, which puts our citizenry in the aggregate on a sound financial footing.

The pressure on Congress for economy and lower taxes has not borne tangible fruit, as the budget will stand approximately as originally announced in January. One result, nevertheless, will be helpful. It is stated that in our foreign aid program there will be fewer outright cash grants and more money put out on a loan basis.

In military spending it will be impossible to trim the budget as long as there is no assurance that the Reds, in spite of their peace and disarmament drives, will act on their part in good faith. This may come in time, but probably not in the immediate future.

It now appears that new laws affecting labor unions will not be considered until next year. Even those affecting the regulation of union welfare funds will not be acted upon this year. The union chiefs are now threatening to start a third political party to preserve their status quo.

The easing of FHA down payments to spur home building is a good probability, which will have a favorable effect on the wire industry, especially in the electric wire and cable end.

It has been estimated that the wire mills are operating 15 per cent or so under the general average of business, with a slackening in demand for rods and wire, due primarily to imports, which are coming in at the rate of 60,000 tons annually. Even so, a slightly better demand was expected for June over the two preceding months. Some of the increase will be due to buying in anticipation of summer price increases.

An active pick-up in manufacturers' wire orders is not expected before the fall months. Order backlogs now are small. The vacation season will cut output for July considerably.

In spite of this not too bright report, the general decline over 1956 is small and business for this year will compare favorably with the total for last year. The low point of the year, economists believe, has been reached and the second half should show steady favorable gains.

Edmund Duval Bickels

EDITOR

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# 123 PASTE COMPOUND	440 LBS. NET	An economical highly-fatted emulsion-type wet-drawing lubricant for use on ferrous and non-ferrous coarse and intermediate sizes.
T-2 POWDER	250 LBS. NET FIBER DRUM	An inexpensive compounded sodium soap for use on high- and low-carbon rod and wire. Readily cleaned after drawing and annealing.
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Vol. 32 JULY, 1957 No. 7

Stainless Spring Wire

by John Francis Trant
Cold Draw Department
Atlas Steels Limited
Welland, Ont., Canada

This paper was presented at the Canadian Regional Meeting of The Wire Association on May 13, 1957, at Hamilton, Canada. Mr. Trant is a graduate of the University of Toronto and holds degrees of B.A.Sc. and is a member of the Ontario Association of Professional Engineers. He has been with Atlas Steels since graduation, being first employed in the Industrial Engineering Department as Time Study Engineer. He became successively Engineer of Standards and Job Classification and Foreman in the Cold Draw Department (1955). This department produces high carbon, high alloy, stainless and high speed bar and wire.

Introduction

Stainless steel springs must be used in certain applications such as in corrosive atmospheres, elevated temperatures, or where relatively non-magnetic materials are required. The purpose of this paper is to present data on the characteristics of the commonly used grades of stainless steel spring wires which will enable users of stainless steel spring wires to select the proper grades and to understand the manner in which the characteristics of these steels affect their design and performance.

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The 300 series of Stainless Steels are non-magnetic and since they are austenitic, they may only be hardened by cold work. Some grades such as Types 301 and 302 are not stably austenitic and some magnetism may be introduced by the severe cold working necessary to achieve the desired tempers. They may be restored to a non-magnetic state by stress relieving or by passing through a demagnetizing coil.

Tempers Available

The tempers for full hard spring wires of the 300 series vary with the size of the wire. Since the temper achieved is proportional to the amount of cold working, the temper of the larger wires is limited by the size of coil available to cold work. An ultimate tensile strength of 200,000 psi requires about 60% to 80% reduction in area depending on the grade. Thus, a strength of 200,000 psi in ½ inch round 300 series wire would require an original diameter of the order of ⅞ inch. Because of this limiting factor, it is not practical to produce strengths over 200,000 psi in sizes larger than 3/16 inch round. If high strengths are required in sizes over 3/16 inch round, Type 420 is used. This grade is hardened and strain relieved after forming. The following Table I shows the variation in temper with wire diameter for as drawn wire in coils.

TABLE I

TEMPERS OF STAINLESS STEEL SPRING STEELS IN COILS
MINIMUM ULTIMATE TENSILE STRENGTHS
IN POUNDS PER SQUARE INCH

DIAMETER	TYPES 302 & 304	TYPE 316	TYPE 420
.036 - .075 In.	250,000	225,000	Quench in oil from
.076 - .100 In.	230,000	215,000	1800-1875°F.
.101 - .125 In.	220,000	200,000	Temper to suit at
.126 - .175 In.	200,000	185,000	300-900°F. to de-
.176 - .225 In.	180,000	165,000	velop approximately
.226 - .313 In.	160,000	150,000	250,000 psi.
.313 - .375 In.	140,000	130,000	
.376 - .500 In.	130,000	120,000	

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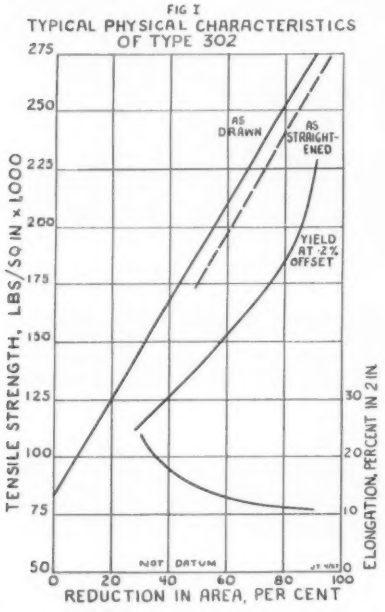
Spring temper wire may also be supplied in straightened and cut lengths. Straightened wire will have a lower Ultimate Tensile Strength (U.T.S.) than the "as drawn" wire in the coil before straightening. Figure I shows the drop in U.T.S. for a sample of Type 302 wire after straightening. This drop is probably due to the introduction of neutralizing stresses during straightening and will vary in amount with the degree of cold working and ratio of yield to Ultimate Strength. The wire may be restored to its original strength, and fatigue life improved, by stress relieving at

400° F. to 750° F. for 30 minutes to 60 minutes the bare wire after forming.

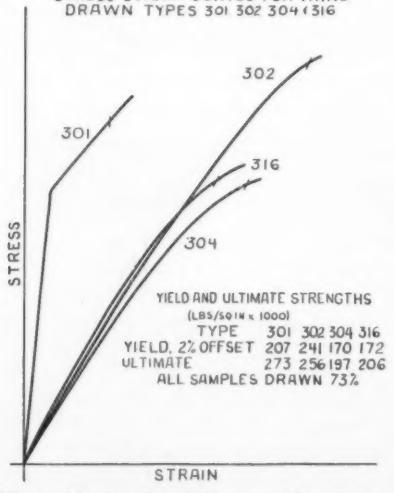
FIG I
TYPICAL PHYSICAL CHARACTERISTICS OF TYPE 302



Physical Characteristics

The forming and performance of spring temper stainless steel wire is adversely affected by several of its physical characteristics. The stress-strain curve shows that these steels have no straight line portion with a definite yield point. Figure II shows stress-strain curves for four grades which have each been given 73% reduction in area from .312 inch round to .162 inch round in 4-28% passes. The yield point shown is at .2% offset.

FIG II
STRESS STRAIN CURVES FOR HARD DRAWN TYPES 301 302 304 & 316



Note that all of the grades have produced curved lines with the Types 301 and 302 most closely approximating a straight line. This characteristic means that the austenitic steels will produce springs with greater set than springs made from the carbon steels and will perform best at low working stresses.

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The curve shown in Figure I for Elongation shows that this sample of Type 302 retains a useful amount of ductility even after cold working to spring temper. This will enable it to withstand severe use in service without breaking.

★ ★ ★

No curve has been shown for hardness. This is because there is no correlation between hardness and other properties for hardnesses greater than Rockwell C 40, which is reached at about 40% R.A. It is not advisable therefore, to attempt to determine the temper of spring steels by converting into tensile strength according to any of the charts showing the relation between hardness and tensile strength.

★ ★ ★

Another characteristic which varies with the amount of cold work is the ratio of yield strength to ultimate strength. This is shown in Figure I. This variable ratio will also affect the amount of set with the set increasing as the ratio of yield strength to ultimate strength decreases.

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The variables mentioned in the foregoing discussion show that the production of stainless steel spring temper steels is a task which must be closely controlled at each step in the procedure, both in making the wire and in forming by the spring maker if the product is to meet the desired specification. An outline of the method and controls used by Atlas Steels Limited to produce quality austenitic spring steels follows.

Production Controls

Spring steels or hard drawn steels may be ordered to a definite U.T.S. or may be ordered "hard drawn". If ordered to a definite U.T.S., the wire is produced to the U.T.S. specified ±10,000 psi unless the customer has specified the range. If ordered "hard drawn", the wire is produced to the tempers shown in Table I with an aim tolerance of ±10,000 psi.

★ ★ ★

The U.T.S. of hard drawn wire for a given percent reduction will vary with the original diameter, the original hardness, number of passes taken, and the analysis of the wire. Slight changes in the Chromium, Nickel, Manganese, and Carbon contents will have marked effects on the work hardening rate. If the wire has been ordered straightened and cut to length, there will also be a drop in hardness which will vary with the amount of flexing during straightening. Therefore, as a means of determining the cumulative effect of these variables for each heat of spring wire stock, a Rate of Work Hardening curve is drawn. This curve is used as the basis for determining the reduction in area necessary to produce a given temper.

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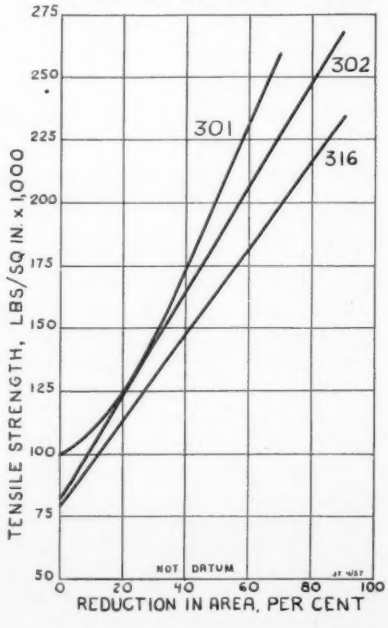
Figure III shows typical curves for Types 301, 302, and 316. The differences in the slopes of these

FIG III
TYPICAL RATES OF WORK HARDENING



curves show the effect of the variation in analyses, and the height of the curve is affected by the starting hardness. All the curves were plotted from data obtained from annealed .312 inch round wire drawn to .092 inch round in seven 28% passes. Drafts of 28% are used because this is the draft between blocks on the continuous machine on which most of our spring wire is produced.

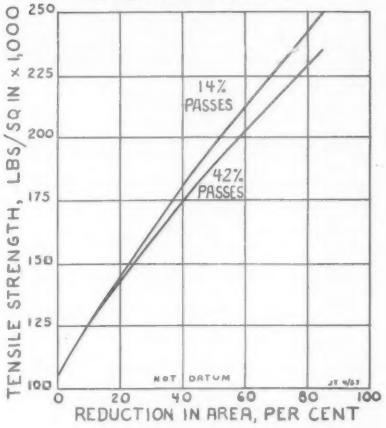
★ ★ ★

The first step in producing an order of spring wire is to select the heat to be used. From the Rate of Work Hardening curve for the heat selected, a per cent reduction is determined which should produce wire which will fall within the specified U.T.S. range for the finished wire. The starting size of the wire before drawing to hardness is then calculated. We prefer, where possible, to use wire which has been cold drawn and annealed as stock for drawing into spring temper. By doing this, we are assured of a wire which is truly round and has had any hot rolled defects such as laps, seams, slivers, underfills and overfills removed. The wire will, therefore, cold work uniformly since those conditions prone to cause scratching and breaking have been eliminated. Every effort must be made to secure good stock since the wire will have to be drawn several passes without scratching or intermediate annealing.

★ ★ ★

A sample of wire is then drawn to finished size, straightened, if specified, and tested before the whole order is drawn. It may be found necessary to adjust the drafting so the order will fall precisely within the desired U.T.S. range. This may be done by increasing or decreasing the starting size or by adding or subtracting passes. Figure IV shows how the U.T.S. may be varied by varying the number of passes. The curves are for samples taken from the same coil of Type 302. The upper line is for a sample which has been drawn in 14% drafts and the lower line in 42% drafts. Once the exact drafting has been determined, it is then possible to proceed with drawing the entire order.

FIG IV
VARIATION IN HARDNESS WITH NUMBER OF PASSES



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Great care must be taken while drawing to ensure that the wire is cast flat. If the wire is not properly cast, it will be very difficult to handle while forming and will not form into uniform springs. If necessary, the wire is run through a caster after passing through the last die before it is wound on the block.

Example

The following example is quoted to show how the analysis of the wire used and the finished condition greatly affect the tensile strength of the wire.

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Desired product: Type 302 wire, centreless ground, .100 in. dia. ±.001 in., UTS 225,000 psi ±10,000 psi.

★ ★ ★

To supply this order, it was necessary to use two heats of steel, one heat being Type 302, but the other heat was Type 301, which substitution was agreeable to the customer. The analyses of the heats were as follows:

TABLE II

ANALYSES OF HEATS

TYPE	HEAT	CARBON	MANGANESE	CHROMIUM	NICKEL
301	C3121	.095%	1.42%	17.06%	8.07%
302	C3088	.06	1.38	17.73	8.68

★ ★ ★

From sample Rate of Work Hardening curves which had been plotted, it was estimated that the Type 301 would require 59% reduction in area and the Type 302, 75%. When these reductions were made to test pieces, the following results were obtained:

TABLE III

VARIATION IN ULTIMATE TENSILE STRENGTH WITH FINISH AND TYPE

	TYPE 301	TYPE 302
As Drawn	243,000 psi	251,000 psi
As Straightened	184,000	216,000
As Ground	191,000	220,000(est.)

★ ★ ★

It will be seen that the Type 302 finished quite close to the desired U.T.S. The Type 301, however, did not fall within the desired range and it would be necessary to increase the reduction in area to meet the specification. Note that the loss in straightening the Type 301 was 59,000 psi compared to 35,000 psi for the Type 302. The loss normally expected on straightening is in the order of 20,000 to 30,000 psi. If the normal loss only was encountered, the Type 301 would have finished well within the tolerance. This excessive loss may be related to the rapid rate of work hardening which is typical of Type 301.

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The neutralizing stresses introduced during straightening the Type 301 appear to have built up more rapidly than usual and relaxed more of the work hardening stresses than normal. The increase in strength after grinding shows that straightening puts a highly stressed skin on the surface of the wire. It is probably desirable for many applications that this skin be removed by polishing or grinding. Variations in the stresses in this skin are a fertile field for the start of fatigue cracks or galvanic corrosion.

★ ★ ★

The example bears out qualitatively what has been shown in Figures I and III, i.e., the loss of U.T.S. on straightening and the variation in rate of work hardening with analysis.

(*Please turn to page* 814)

Metals in Communication and Power Transmission

by Dan Boyd
Metallurgical Department
Cable Engineering Laboratories
Wire and Cable Division
Northern Electric Company Ltd.
Lachine, P. Q., Canada

In this paper, delivered at The Canadian Regional Meeting of The Wire Association at Hamilton, Ontario, on May 13, 1957, the author discusses the application of non-ferrous metals used in special jobs in Canada for submarine, power and other uses.

Mr. Boyd is a graduate of the University of Toronto with a degree in Metallurgical Engineering. He worked first as an assayor for a mining company, then joined the American Electrical Works (now Kennicott Wire & Cable Co.) in Phillipsdale, R. I. and since 1929 has been a metallurgist for his present company.

Canada is one of the leading metal producers in the world, ranking in the first five in the tonnage metals, aluminum, copper, lead, nickel, zinc and iron. All these metals with one exception are mined, smelted and refined in Canada. The one exception is aluminum for which the ore is imported. The processing of this ore in Canada requires the expenditure of 10 KWH of electrical energy per pound of metal produced so that the finished ingot has a large part of its value represented by Canadian power and labor.

★ ★ ★

In the generation, transmission and receiving of electrical energy for use as power or as communication signals practically every known metal is used in one part or another of the complex equipment required for generating, controlling, converting, amplifying or switching the energy transmitted. The actual transmission of the energy, for reasons we will see later, makes use of relatively few metals but uses these metals in large tonnages. Because of the quantities involved, economic factors as well as technical considerations play a part in deciding what metals are used. These metals are iron, copper, aluminum, zinc and lead and form the components of the wires and cables which transmit the energy.

Usage of Metals in Canada For Electrical Conductors:

The latest available figures issued by The Dominion Bureau of Statistics for the year 1955 indicate in round numbers the following usage of metals in electrical conductors:

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Copper	150,000,000 lbs.
Aluminum	40,000,000 "
Iron & Steel	40,000,000 "
Lead	50,000,000 "

★ ★ ★

Figures for zinc and tin are not easily available since these metals appear only as coatings on iron, steel or copper. Of all these metals only copper and aluminum serve as carriers of current. The others are used either to provide strength or support to the copper or aluminum or as a sheathing material or as a protective covering. Consumption of all these metals is steadily increasing and the 1956 figures when available will show a greater consumption than those given above. When it is realized that on the average use of electrical energy doubles every ten years it is obvious that the demand for these metals will show a steady increase.

Requirements for Electrical Conductors:

In addition to a reasonable and fairly stable price metals for electrical conductors must be easily fabricated and have reasonably high values in two important properties, namely electrical conductivity and tensile strength. (See table, Fig. 1.)

Figure 1
Conductivity of Metals in Terms of the International Annealed Copper Standard

	Purity %	Conductivity %
Silver	99.99	108
Copper	99.99	102
Copper(commercial)	99.94	101
Aluminum	99.99	65
Aluminum IS	99.60	61
Gold	99.99	74
Magnesium	99.80	39
Nickel	99.95	25
Zinc	99.99	29

Tensile Strength

Copper—Annealed	35,000 psi
Copper—Hard Drawn	62,000 "
Aluminum—Annealed	15,000 psi
Aluminum—Hard Drawn	26,000 "

★ ★ ★

The standard of electrical conductivity is the International Annealed Copper Standard which represents 100% conductivity for annealed commercial copper of 99.91% copper content. This table shows the conductivity of several metals in terms of this standard. You will note that it is important to state the purity of the metal when giving its conductivity. The standard was adopted in 1913 by the International Electrotechnical Commission. At that time, commercial copper for electrical use was 99.91% pure. Over the years, the average purity of commercial copper has risen to 99.94% and the conductivity exceeds that of the standard by 1%. The same effect can be seen in the conductivities

of high purity 99.99% copper and aluminum.

★ ★ ★

From this table it can be seen that silver has the best electrical conductivity which would make it an ideal electrical conductor were it not for its cost. It is apparent that our choice is narrowed down to copper and aluminum. Copper has long been the metal universally used for this purpose.

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Aluminum has made and is continuing to make rapid advances in this field. Copper, in addition to having higher electrical conductivity, also has an advantage in tensile strength, having somewhat more than twice the strength of aluminum in either the annealed or hard-drawn condition.

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The tensile strength of pure metals can be increased by alloying with another metal. This however, has a very pronounced effect in lowering conductivity.

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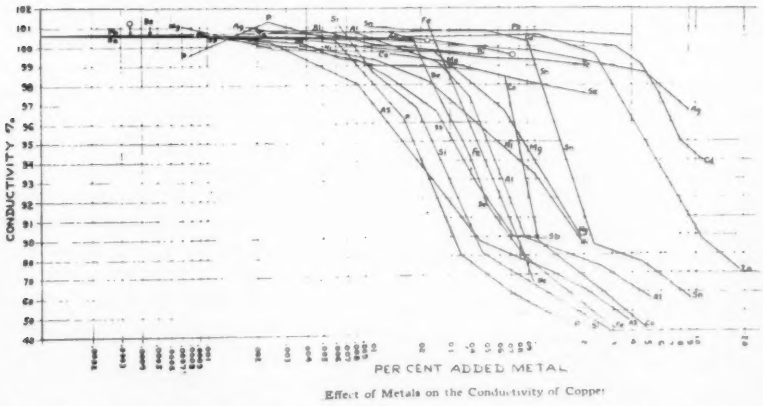
Figure 2 shows the effect of very small additions of 19 other metals to pure copper. The conductivity is appreciably lowered by additions which in most cases are not of sufficient amount to have any marked effect in raising the tensile strength.



Effect of Metals on the Conductivity of Copper

Fig. 2. Effect of Metal Additions on Conductivity

Copper, therefore, qualifies as to the two properties of electrical conductivity and strength as the best commercial metal for electrical conductors. This is not the whole story, however; aluminum owes its rapid growth in this field to two other factors which are playing an increasingly important role.

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These factors are availability and price.

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With respect to availability, this tabulation (Figure 3) from the U.S. Geological Survey shows the relative abundance of several metals in the upper ten miles of the earth's crust. With aluminum taken as 100 we see that there is only 12/100 of a pound of copper for each 100 lbs. of aluminum. Aluminum supplies are virtually inexhaustible. Copper ore reserves are being depleted at a faster rate than new deposits are discovered, consumption is increasing and the long term outlook for copper seems to be increasing scarcity and rising prices.

Fig. 3 - Abundance of Metals in Upper Ten Miles of Earth's crust- U. S. Geological Survey

Aluminum	100.0
Copper	0.12
Lead	0.025
Zinc	0.05
Iron	62.0
Magnesium	26.0
Titanium	8.0

In considering price comparison between copper and aluminum the relative specific gravities of the two metals must be considered. Aluminum has a specific gravity approximately one-third that of copper. On this basis one pound of aluminum would make as many feet of a given size of wire as three pounds of copper. However, since the electrical conductivity of aluminum is 61% of copper, in order to get equal current carrying capacity the aluminum wire must be used two AWG sizes larger than the copper wire. This reduces the amount of copper equal to one pound of aluminum from three to two. If we take the current prices as 25 cents per pound for aluminum and 32 cents per pound for copper we see that 25 cents worth of aluminum will replace 64 cents worth of copper. This is a very strong factor tending toward the increased use of aluminum for conductors. However, this saving is not fully realized in the case of conductors having an insulated covering. The increase in the diameter necessary in the aluminum in order to obtain equal current carrying capacity means an increased quantity of insulation which reduces to some extent the differential previously mentioned. These are the two metals used mainly as conductors of the electric current. We will now consider the other metals which are used in considerable quantities generally as complements to the actual conductor.

Iron and Steel

While used to some extent as a current carrying metal as bare line wire in communication work, the chief use of iron and steel is a strengthening or supporting member for cables. It can be seen generally in rural areas as a stranded cable called a "messenger" supporting a lead covered cable which is attached to it by closely spaced steel wire rings or lashed to it by a spiral wrap of steel wire.

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The steel strand carries the load between the poles since the cable itself has insufficient strength to be self-supporting. Steel wire strand is also used as a "guy" cable to support poles at the end of runs or at changes in direction of the line. High strength steel wire or strand is used to strengthen high voltage aluminum transmission cables. These cables are known as A.C.S.R.—aluminum cable steel reinforced. In these cables the steel wire or strand

forms the core with the aluminum wires stranded around it. Another instance where steel is used as a strengthening agent is in a copper covered steel wire. This material is made in one method by casting copper around a steel billet, in a non-oxidizing atmosphere. The copper solidifies and welds to the steel. The billet is hot rolled to a bar and the bar is further hot rolled to the rod. Another method is to electroplate copper on to a steel rod. The rod made by either method is then cold drawn to various sizes of wire. It is rather remarkable that during all these operations the ratio of the copper thickness to the diameter of the steel core remains constant. The electrical conductivity of copper covered wire is a function of the copper thickness. Two grades are made which have copper thickness sufficient to produce wire having 30% and 40% electrical conductivity. This is an example of the sacrifice of part of the electrical conductivity in order to gain strength. The excellent corrosion resistance of copper is retained. The additional length permits the use of long span construction.

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Steel wire is used as a protective armour stranded around cables used in submarine crossings. Steel in the form of tape or strip is also used as a protective armour on cables where an exposed location might make them subject to damage.

Zinc

All the zinc used in the industry is in the form of a galvanized coating on the steel wire, strip or tape previously mentioned. It serves only as a protection against corrosion.

Lead

For over 70 years lead has been standard sheathing material for communication and power transmission cables. It provides an impervious, moisture proof, corrosion resistant covering to protect the insulation. It has an advantage of high plasticity at moderate temperature which enables it to be easily extruded on to cables without danger of heat damage to the insulation. It has the disadvantages of low strength and its softness makes it susceptible to damage so that the use of a protective armour is necessary where damage from external sources might be expected. Lead is being replaced to some extent by two recent developments in this field. One of these is known as "Stalpeth," which is now being used to an increasing extent as a sheath for communication cables.

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The name is derived from a combination of letters from the names of the materials composing the sheath, i.e., "st" for steel, "al" for aluminum and "peth" for polyethylene. The sheath consists of a longitudinally applied transversely corrugated strip of aluminum 5 to 8 thousandths of an inch thick. This is formed round the cable core. The edges do not overlap since this strip merely acts as an electrical shield. Simultaneously with the application of the aluminum strip a transversely corrugated strip of tin plated steel 7 thousandths of an inch thick is applied longitudinally over the aluminum strip.

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The edges of this strip overlap and are continuously soldered together by feeding a strip of rosin core solder between the overlapping edges and heating by induction heat. This forms a moisture proof barrier. The next step consists of flooding the surface of the steel with a thermoplastic compound and extruding a closely fitting covering of black polyethylene.

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This jacket provides additional moisture proofing and is also abrasion and corrosion resistant. A cable with this type of sheath is on the average half the weight per unit length of the same size lead sheathed cable. Its cost compares favorably with lead sheathed cable and it provides further economies in freight, handling and installation costs.

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The second development in cable covering is the all-aluminum sheath. It has the obvious advantages over lead of light weight and high strength. It is not as corrosion resistant as lead and for buried cable it will require additional protection. Present methods of applying the aluminum sheath to the cable core consists of either pulling the core into an aluminum tube then swaging the tube to a close fit on the core, or forming an aluminum strip round the cable and continuously welding the seam and then swaging or drawing the welded tube to a close fit on the core. These methods have manufacturing disadvantages which makes the ultimate objective the direct extrusion of aluminum on to the cable core in a similar manner as is done with lead. The problem here is to extrude the aluminum at a temperature which will not damage the insulation on the core. To do this requires increased pressures which require heavier and more powerful presses, larger capital investment and sufficient demand to keep the investment working. Presses for this work have been designed and built but are yet in limited commercial production.

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I will now show some illustrations of the cable I have mentioned and some of the more unusual types that have been manufactured, showing the application and extent of the use of the various metals we have been discussing.

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Figure 4 is the type of cable used to link telephone exchanges. It contains 2424 pair of No. 26 AWG copper wire or 4848 wires in all. Each pair of wires constitutes a telephone circuit. The individual wires are insulated with a wrap of paper a few thousandths of an inch thick. The insulated wires are twisted into pairs and 101 of these pairs are stranded into a unit. Twenty-four of these units are cabled together with a spiral wrap of paper. The units and the pairs in the unit can all be identified by a system of color coding of the paper. The odd pair in each unit is a spare. The core is covered by a closely fitting lead sheath. The outside diameter of the finished cable is approximately

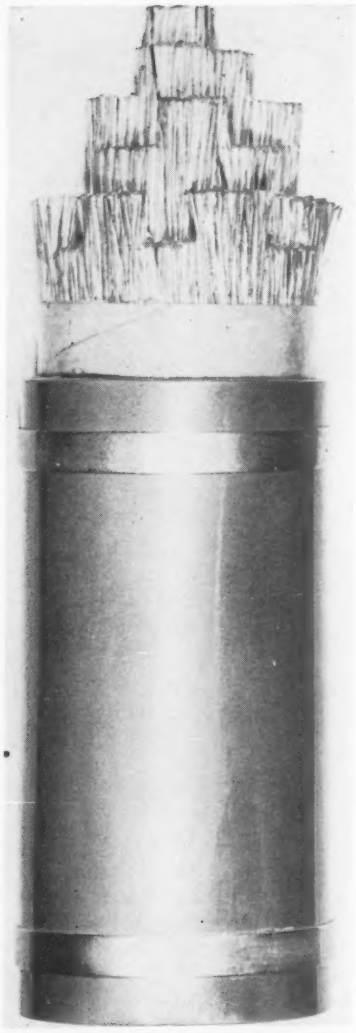

Fig. 4. 2424 Pr. Exchange Cable—Lead *

3 inches.

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Figure 5 is the same type of cable as was shown in Figure 4 except that it has a Stalpeth sheath instead of lead and in addition to the 2424 pairs of No. 26 copper wires it has two video pairs of No. 16 AWG copper for television transmission. The Stalpeth sheath that I described earlier is shown here. This cable is also approximately 3 inches O.D.

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Figure 6 cable contains 756 paper insulated copper wires. It is 3⅝" O.D. Note that the cable itself is relatively small, the core under the lead sheath being approximately 1⅞" diameter. The rest of the diameter, nearly two

Fig. 5. 2424 Pr. Exchange Cable—Stalpeth * * * * * * * * * * * *

inches is given over to protection, i.e., the lead sheath, double layer of bitumen impregnated jute, layer of galvanized steel wire armour, another layer of impregnated jute, another layer of steel wire and a final outside layer of impregnated jute.

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In Figure 7 we have tin coated stranded copper conductors. The tin protects the rubber insulation from chemical action with the copper.

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Figure 8 shows a submarine power cable with oil impregnated

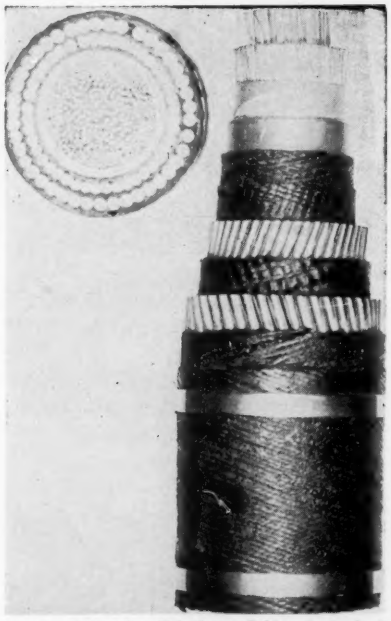

Fig. 6. Submarine Telephone Cable * * * *

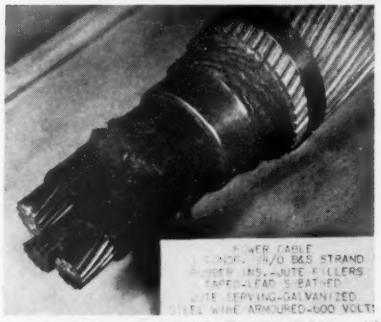

Fig. 7. Rubber Insulated Power Cable with Lead Sheath and Steel Wire Armour * * * *

Fig. 8. Paper Insulated Power Cable—Armoured

paper insulation, lead sheath, double steel wire armour with impregnated jute bedding and overall covering. This is the same type of protection given the submarine telephone cable shown earlier in Figure 6.

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Figure 9 shows a rubber insulated cable with tinned stranded

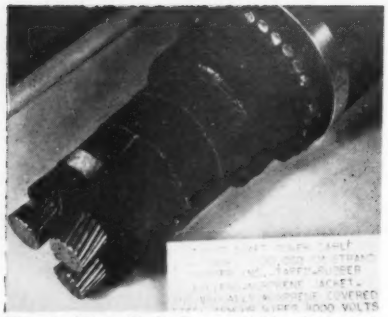

Fig. 9. Mine Shaft Power Cable—Armoured

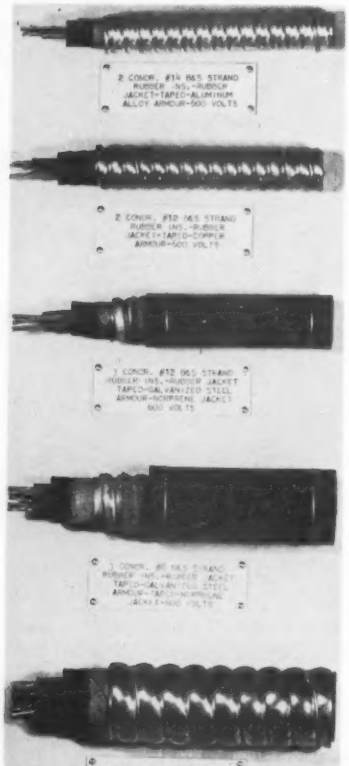

Fig. 10. Teck Cables * * * * * * * *

copper conductors. It has a neoprene jacket instead of a lead sheath and the steel armour wires over the jacket are individually covered with neoprene. This construction gives about the maximum of corrosion protection. Corrosion from mine waters can be very severe on unprotected metal.

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Figure 10 shows other types of cable that are used in mines for light and power distribution. The name comes from the Teck-Hughes Gold Mines, Kirkland Lake, who were the original users of cable

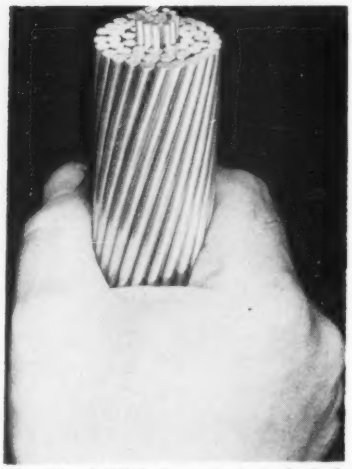

Fig. 11. A.C.S.R. * * * * * * * * *

of this construction. Its use has also spread into the pulp and paper industry, where corrosion protection is required. The cables shown are all rubber insulated with different sizes and numbers of conductors for different services. The feature of them all is that they are protected by a flexible metallic armour. The top one has an aluminum alloy armour and the second one has a copper armour, as has the lowest one. The other two have a galvanized steel armour which requires corrosion protection in the form of a neoprene jacket over the armour.

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Figure 11 is the aluminum conductor steel reinforced cable described earlier. The reinforcing steel strand can be seen in the centre of the cable. This particular cable is 1.4 inches in outside diameter. It has 54 aluminum wires stranded in three layers over a stranded 19 wire high strength steel core. This is the cable which is being installed for power transmission of large blocks of electric power at 300,000 volts in Province of Quebec.

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Figure 12 shows an armoured single conductor submarine power cable with a stranded copper conductor, impregnated paper insulation and a lead - antimony alloy sheath. It differs from the standard armoured power cable in that for the armour, instead of galvanized steel wire, 30 wires each 0.128 in. in diameter of 57S hard

Fig. 12. Bowen Island Aluminum Alloy Armour * * * * * * * * * * *

drawn aluminum alloy are used. This is an aluminum-chromium-magnesium alloy. This alloy was used in order to have a non-magnetic material in the armour which with the sheath and water forms one phase of a three-phase grounded system, using two single conductor cables. The cables are laid in salt water between West Vancouver and Bowen Island, B.C. and after 6 years service the armour is showing no appreciable corrosive attack.

Movie of Dredge Cable

Mr. Boyd then showed a motion picture of a unique Canadian mining operation that makes use of one of the largest cables his company has manufactured.

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This cable weighs 27 lbs. per foot, made up of 10 lbs. per foot of copper, 9 lbs. per foot of steel and 8 lbs. per foot of insulation and protection.

NEWS OF INTEREST TO THE WIRE AND CABLE INDUSTRY VOL. II No. 3

WIRE Recorder

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Drive-in Phones Hit the Road

No need to leave car

Curb-service telephones are the latest addition to the growing list of drive-in services offered to the American motoring public.

Not to be confused with the conventional telephone booths which have been moved out of the drug store and already dot sides of our highways, the drive-in telephones are mounted on metal stands at the level of an average passenger car window, allowing the motorist or passengers to talk while remaining in the vehicle.

On the experimental telephones now in operation in Chicago, the curb-side phones are enclosed in a three-sided plastic hood for weather protection. A directory is conveniently stored in a metal box below the instrument. The phones will be lighted at night and a nearby sign will read, "Phone from your car here".

It is expected in a short while that this newest symbol of our frenetic times will replace the highway booth.

Experimental model of the new "drive-in" telephone developed by Bell Telephone Laboratories. Phones are mounted on metal stands beside roadways, providing "curb service" for telephone users. A bright-colored plastic hood shields the instrument from bad weather. The telephone directory is placed in the square, metal box below the instrument. The drive-in phone is now undergoing field testing in Chicago, Ill., and in Mobile, Ala.

Air-Conditioning Sales Pegged High For 1957

Bonus Benefits Stretch Selling Season

Manufacturers of both room and central unit air-conditioning equipment are looking for an "explosive" growth within the next five years. Sales goals for '57 are 2 million units and 250 thousand central cooling units, representing a healthy growth over 1956 sales.

Most of this bullish optimism stems from the development of quieter, smaller, better looking, and more efficient products. It also leans heavily upon faith in new marketing practices which have extended the air-conditioning sales season beyond the usual summer months. In effect, the product has more selling features, is easier to install, and costs less.

The consumer is being sold such bonus benefits as germ-free air for convalescents and invalids, controlled humidity for asthmatics, and pollen-dust-free air for allergics. By plugging these "plus" features, the industry hopes to eliminate the curse of a short seasonal sales period in most of the country. Very shortly development of the heat-pump type system, which will be a year-round heating and cooling job, will complete the cycle.

Looking at the market from a little longer range, the greatest potential for air-conditioning sales actually lies in the hundreds of thousands fully insulated weather-tight postwar homes which at the present time have a forced-air heating system. Most major manufacturers of cooling equipment have put on the market a complementary cooling unit which can quickly, easily, and inexpensively add to present equipment, utilizing existing blowers and duct work. Manufacturers of heating equipment are in the "act" with this type of additive unit as well. There can be little question that in time the residential room air-conditioning unit must become obsolete.

Naturally, price reductions contribute to the bright sales picture. One manufacturer reports that the cost of central cooling systems has dropped from between 50% to 60% in the four years from 1952 through 1956. Still another states that in the past three years the average purchase price of a room unit has been shaved by $50. All the air-conditioning trade needs now is a few days of really hot, sticky weather!

Radio-telephone service, air-to-ground, will soon join ship-to-shore convenience for busy people in flight. Its use is soon to be tested by the Illinois Bell Telephone Company starting this summer. The air-to-ground project was initially planned for use by private planes. However, Bell expects to make the service available to commercial and military aircraft as well. Depending upon distance, rates for a three-minute call are expected to range from $1.50 to $5.25.

With power steering on passenger cars selling at double the rate for 1956, the American public has proved to manufacturers that it wants power equipment on its cars and is willing to pay extra for it. Reports show such a substantial increase in sales of all power items that larger power and electrical systems have become necessary to accommodate the increased load and electrical wiring for automatic transmission, power steering, brakes, seats, windows, and convertible tops. Some manufacturers even contemplate making automatic transmissions standard equipment next year.

A new picture tube that shrinks TV set size is expected to bolster sagging TV sales so important to the fine insulated wire market. The new design, by utilizing a wider deflection angle (110 degrees), shortens the length of the tube by 6". This makes it possible to build a shallower, lighter set which is easier to handle and takes up much less space in the room. Developed and first introduced on the market by RCA, this new tube is being adapted by many set makers. Ultimate goal is a flat set that can be hung on the wall like a picture.

A new electronically-controlled farm machine, which makes and delivers to cattle feed troughs 1,000 pounds of feed per minute, is currently in operation on a large California ranch. Setting the "dinner table" for the 10,000 head of cattle on this ranch was previously a job for thirty men. Now with the help of electronics, three men handle the same job in much less time. The "Automat" finally comes to the farm with electronic mass feeding for cattle!

Long needed improvements in truck lighting to keep pace with modern traffic and road conditions are on the way. The four headlights now found on some 1957 passenger cars will appear on light trucks in 1958. Industry spokesmen say they will be standard equipment in the truck industry by 1960. Tail-lights are also receiving serious attention from manufacturers. They believe that, for practical safety, larger, more effective lights are needed at the rear. The changes will include important modifications and innovations in signal and back-up lights.

Robot elevators, almost human, are appearing more and more often in new office buildings in our larger cities. Equipped with "brainy" electronically-controlled devices, these new elevators are even able to "count those who wait, speed-up the coffee hour, and go to sleep at night". Industry sources report these unmanned elevator systems are specified for almost every new office building under construction. At the same time, conversion of older, manually-operated systems is going on at a rapidly accelerated pace. They don't yet say, "Move to the rear, please".

E.E.I. Urges Farmers "Farm Better . . . Electrically"

"Live Better" campaign Sequel

During the past two years, the "Live Better . . . Electrically" program has proved emphatically to virtually every segment of the electrical industry that effective promotion and merchandising can do an outstanding selling job to the American homeowner. The lessons learned from this promotion caused industry leaders to look in the direction of the American farm. They feel that a practically untapped market for rural electrification can be sold to the farmer in almost the same manner.

The new program, prepared by the farm group of Edison Electric Institute, united manufacturers of electrical equipment, power suppliers, the farm press, educational organizations, and other interested groups in a common effort to promote "Farm Better . . . Electrically".

The continuing campaign will endeavor to make the American farmer more aware of the economies and convenience of complete electrification; to induce him to look into the results achieved by other farmers who have put electricity to work as an important hired hand. It will also appeal to the farmer's wife, showing her how modern electric appliances can not only increase efficiency but lighten most household tasks.

As in the consumer program, it will again be necessary to sell rewiring as the first and most important phase of the entire program. While many farms now have electric service, they do not have the adequate capacity to handle the greater loads put upon the lines by the heavier farm equipment in use today.

If this program catches fire with the farmers as "Live Better . . . Electrically" has with the nation's homeowners, it will have tremendous far-reaching influence on the wire industry for many years to come.

Unusual Financing Package Pushes Rewiring Sales

Portland plan sets pattern for other cities

Easier financing for rewiring has proved to be a big part of the answer to the problem of selling homeowners on the idea, "Live Better . . . Electrically". The merchandising program tried out for the past three years by the Portland, Oregon, General Electric Company shows greatly increased sales for manufacturers, contractors and related suppliers of electrical appliances and equipment.

An extensive advertising and publicity campaign alerted homeowners to the advantages of the many new and wonderful electrical appliances now available to make their lives more enjoyable! It also pointed out the important but often neglected fact that the home wiring requirements change as load capacity increases, and that quite often rewiring is necessary so that many of the new time- and work-saving electrical appliances can be enjoyed to the fullest.

The advertising campaign was implemented with an unusual financing package which was made available to consumers and appliance dealers alike. The plan provided terms up to thirty-six months for wiring improvements or additions, including incidental plumbing and necessary cabinet work.

More and more manufacturers, electric utilities, and suppliers are expected to initiate similar programs or help sponsor them. A vast market of approximately 75% of all existing homes in the country in need of some degree of rewiring is an enticing prospect for the entire wire industry.

Closed-Circuit TV Powerful Business Tool

Uses and applications increase daily

In closed-circuit television, industry has recognized a powerful new tool. This newest communications miracle is now used to boost sales, increase service, and even check production. In the field of public service, it also aids educators, hospitals, and isolated communities.

More than $100 million has been invested in closed-circuit TV in the past four years. Industry giants such as Ford, General Motors, Chrysler, Westinghouse, General Electric, and Swift head a long list of other industries, business firms, utilities, and institutions using the new medium. Banks now use it to verify signatures, department stores to check shoplifting, hospitals to enable small children to visit sick parents, and railroads to cut average ticket reservation time to 30 seconds instead of 8 minutes.

In other areas, we find surgeons and dentists watching operations in distant cities, churches relaying sermons to overflow crowds, businesses staging sales conventions and meetings in many cities at the same time, politicians holding simultaneous rallies throughout the nation, and leading educators bringing graphic on-the-spot demonstrations and lessons right into the classroom. With one eye on the teacher shortage, school authorities estimate $500 million a year could be saved by the possible elimination of 100 thousand teaching jobs through the installation of closed-circuit classroom TV.

Since its first use not too long ago in 1948 to show a Brooklyn prize fight in Manhattan, closed-circuit TV has made giant strides. New applications in almost every segment of American industry and commerce are being developed almost daily. This effort is entirely different and apart from the work being done simultaneously on pay-as-you-go television programming for the home audience.

Manual Drive-ins Threaten Clerkless Stores

Automatic vending machines continue to play an increasing role in product merchandising. In the past three years the number of coin-operated merchandisers has increased from $2.8 million to $3.2 million. And last year millions of consumers fed a record $1.9 billion in small change to these robot salesmen.

Machine makers and the operators who keep them filled with food, drink, smokes, nail clippers, perfume, pills, nylons, and a host of other products, are optimistic about the future. They see another billion dollars in sales by 1960.

Unlike the simple devices of just a few years ago, the fancy new electrically-controlled mechanical boxes are much more elaborate, in many cases dispensing a variety of products from the one unit. For example: A giant Lunch-O-Mat machine vends sandwiches, coffee, pastry, salads, cold milk, and makes its own change! Another monster device referred to as a "midget automat" has two columns of twelve windows each, vending hot foods, stews, casseroles, beans, and soup in plastic bowls, while a matching machine holds cold items. Coming out this year is a new machine which will keep dishes, such as meat pies, refrigerated until serving time. Then the item will be cooked automatically and delivered with wooden fork at the drop of a coin.

Food firms and machine makers are also watching with interest a recent development in vending machine merchandising: outdoor vending of food, or "the after-hours grocery store." The Grand Union Company has installed a bank of vending machines outside one of their super markets in New Jersey. The unit makes available to shoppers, at all hours of the day or night, such staples as coffee, sugar, doughnuts, tuna fish, eggs, cold cuts, and other meat items.

"Opalon 71344" -55°C to 105°C Compound Ready for Consumers

Opalon 71344, a new polyvinyl chloride primary insulation compound suitable for use from 105°C to −55°C, has just been released for introduction to customers following exhaustive research and field evaluation tests.

Designed primarily for military use, the product has demonstrated properties meeting exacting requirements specified by the armed forces for such uses as aircraft wire. Now, after further research and development in pilot plant quantities where it was fully evaluated for physical and electrical properties, Opalon 71344 is ready for general usage in production quantities. It is available in natural, black, white and in colors.

The suitability of the material for MIL-W-16878A Type B and C, MIL-W-5086, NAS-702, radio hookup and 105°C uses is indicated by the data in the accompanying tables. The excellent high temperature properties of Opalon 71344, together with its superior electrical properties and low temperature cold bend performance at as low as −55°C, make this an important addition to the broad line of Monsanto opalon vinyl compounds for the wire and cable industry.

TABLE II MIL-W-16878A (Type B and Type C)

TEST	CONDITIONING	REQUIREMENT	OPALON 71344
Tensile Strength	As Received	1200 psi min.	4000 psi
Change from initial after heat aging	96 hrs. @ 136°C in gravity convection oven	±50% max.	3800 psi (95%)*
Elongation	As Received	50% (B) 75% (C)	275%
Change from initial after heat aging	96 hrs. @ 136°C in gravity convection oven	−10% max.	255% (94%)*
Completed Wire	As Received		
Spark Test	Immersed in water 2	4 KV (B) 5 KV (C)	Pass
Dielectric Strength	hrs. @ 25 ± 5°C	2.5 KV (B) 3 KV (C) min.	25 KV
Insulation Resistance	Same	30 meg/1000 ft. min.	2000 meg/1000 ft. min.
Heat Resistance	96 hrs. @ 150°C in gravity convection oven	Dielectric Strength: 2.5 KV min. (B) 3.0 KV min. (C)	20 KV*
	Same	Shrinkage ⅛" max.	Pass*
Cold Bend	4 hrs. @ −54°C	Dielectric Strength: 2.5 KV min. (B) 3.0 KV min.(C)	20 KV
Soldering		⅛" max. shrinkage	Pass
Flammability		30 sec. max. burning time	Self-extinguishing

TABLE III MIL-W-5086 (Tentative)

TEST	CONDITIONING	REQUIREMENT	OPALON 71344
Tensile Strength	As Received	1800 psi min.	4000 psi
	4 days @ 136°C in gravity convection oven		3800 psi (95%)*
	60 days @ 113°C in gravity convection oven		3900 psi (97%)*
Elongation	As Received	50% min.	300%
	4 days @ 136°C in gravity convection oven	90% Retention min.	280% (93%)*
	60 days @ 113°C in gravity convection oven		
Life Cycle	120 hrs. @ 121°C in gravity convection oven 5 hrs. @ 25°C in 5% salt water	Dielectric Strength: 1500V	23 KV
Cold Bend	1 hr. @ −55°C 5 hrs. @ 25°C in 5% salt water	Dielectric Strength: 1500V	24 KV
Oil Absorption Immersion	20 hrs. in liquid @ 25°C	Dielectric Strength: 1500V	See Page 5
Abrasion Resistance	As Received		Pass
Flammability	As Received	30 sec. burning time max. 3"/min. burning rate max.	Pass
Insulation Resistance	Humidity Cycle	500 meg/200 ft.	1500 meg/200 ft.
Fungus			Pass

Tests conducted in circulating air oven with average air velocity of 300 ft. per min.

MONSANTO®

MONSANTO CHEMICAL COMPANY

PLASTICS DIVISION—SPRINGFIELD, MASSACHUSETTS

Rod Packaging

by J. S. Laver
Production Planning Superintendent
Steel Company of Canada Limited
Hamilton, Ont., Canada

This paper was presented on May 13, 1957, at the Canadian Regional Meeting of The Wire Association in Hamilton, Ontario.

The author joined the company in 1934 to work on payroll and incentive systems. From 1940 to 1945 he was transferred to cost, audit and office procedure work and then was made Works Accountant. He was assigned to his present job in 1949, in which capacity he is responsible for raw material control, machine loading, inventory control, shipping and the warehousing of finished goods. The movement of large tonnages of rods between their plants was responsible for the development of the packaging project described in this paper.

If our wire mills were located on the same property as our rod mill, I probably wouldn't be talking to you this afternoon. It was the necessity to transport rods to plants located up to 500 miles apart and the storage of a great variety of sizes and qualities that forced us to find a better handling method.

★ ★ ★

Since we manufacture a wide range of goods at each of our plants, we are forced to carry a great number of sizes and kinds of rod in storage. In three of our storage areas we have over 200 grades in stock at any time. As you might expect, with the exception of two or three common grades, 20 to 30 tons per grade would be about the average amount in stock. Unlike many of the United States mills, we are unable to send rods directly to the cleaning lines from the rod mill. Except for a part of nail rod and one or two others, rod mill production is all directed into storage and then rehandled to the cleaning lines.

★ ★ ★

Handling loose coils of rod is much like handling hay. In the case of hay, however, there is usually only one kind in a barn. In spite of this, it proved advantageous to compact and bale tie hay for storage and handling purposes. I am not suggesting that all storage sheds containing loose coils of rods looked like hay piles, but I do know some that did.

★ ★ ★

There is nothing new in the idea of tying several coils of rod together to form a single package. Apparently this has always been desirable. I find that many besides myself have been trying to form a satisfactory package. I would like to say here and now that a satisfactory package is one that is absolutely rigid. I will emphasize this as we proceed. It actually costs less to form a tightly compacted bundle than a loose one. A rigid bundle is actually about as rigid as a coil of flat strip.

★ ★ ★

It was quite a task and only after repeated attempts that we succeeded in getting this unitized package. Actually it took hundreds of test bundles to even determine the type of package for the best over all results. A lot of time was wasted due to the belief that four or at least three tie bands were necessary. Wire, banding and #5 rod were used to tie these coils together. We even used clamp bars and put the bundle under top pressure to determine in slow motion where the bundle started to collapse. Through doing this we found that a preshaped bundle (see figure #1) withstood more top pressure. This then established that two ties only could be used. After further tests it was found that 1¼" banding served the purpose best.

★ ★ ★

We now proceeded to experiment with the amount of pressure required to form a satisfactory bundle. Our rods were in 400 lb coils with an outside diameter of approximately 44 inches. We found that we could reduce 10 of these coils to 70 per cent of their original length and that these could stand careful handling. However, by this time we realized that we must have an absolutely rigid bundle in which the individual coils could not possibly move even under rough handling. We also discovered that it was desirable to preform the ends of the bundle so that the tie bands could be placed at the shortest points.

★ ★ ★

It was surprising to find also that we got about the same amount of reduction in all sizes of rod and wire. Packages have been made up from .120 up to one inch in diameter in both high and low carbon wire and rod. Cold heading ⅜ diameter wire has been put into a package measuring 36 inches in

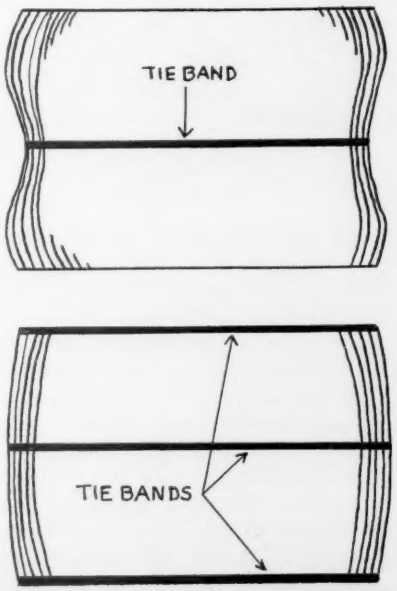


Figure 1. Top bundle withstood more pressure than bottom bundle. Bottom bundle collapsed when piled.

length and weighing 4,200 lbs.

* * *

In an experimental press, it was determined just how much pressure could be applied to the rods without damaging the rod surface. Pressures of up to 100 tons and a reduction of 65 per cent still didn't damage the rod. We backed down to 50 tons and 50 per cent reduction and found we still had a rigid bundle. By applying the compacting pressure at specific points we were able to preform the ends so that the steel strapping could be affixed at the shortest point on the side of the bundle. This prevents one band from sliding around to the other causing the bundle to fan out and become unwieldy. (figure #2)

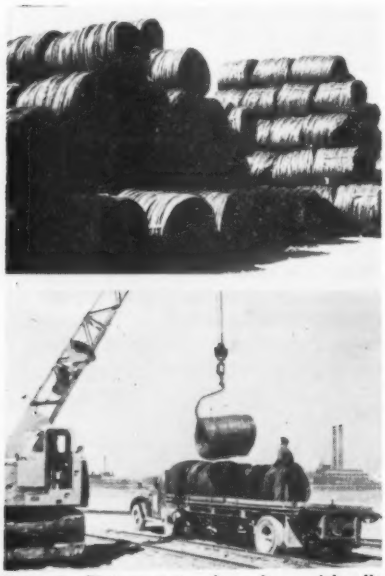


Figure 2. Picture at top shows how rod bundles may be stored without deformation. Bottom picture illustrates ease of handling large bundles for transportation to another mill.

In our compactor, we bear during compression, particularly on four points, the points being diametrically opposite each other. The points are actually projections on the moving faces of the compactor. The curvature of these projections is very important to prevent damage to the rods. At these points the greatest pressure is applied to the circumference. Since the band is passed through the bundle and around it at the point of greatest compression, the ordinary tendency of the bands to slip around the circumference is eliminated. This obviates the necessity to stretch the tie band tightly. Tests proved that there was a greater tendency for tightly stretched tie bands to break. Just mild tension is all that is required when affixing the bands. If the bundle is formed under the above conditions, it will measure about 46 inches at the greatest length and 42 inches at the point where the bands are affixed.

* * *

This bundle will withstand almost any handling including dropping from a height of 4 or 5 feet. They will withstand humping in railroad cars and will pile 6 or 7 high without any egg shaping of the bottom bundles.

* * *

We have two compacting units at present. One is the original unit built for experimental purposes and consists of an hydraulic ram mounted on a lift truck. The other is a large unit built at the end of the rod line and this one unit compacts all of the rod production from our rod mill. I should mention here that this unit is not applying enough pressure and that is why you will see bundles longer than I have mentioned at our Parkdale Works tomorrow. Hydraulic equipment has been ordered to increase the pressure.

* * *

I should also point out that it is my opinion that coils should be suspended on a boom during compression. This is not absolutely essential but I feel it requires less pressure since there is no binding action.

* * *

Now you would probably be interested in hearing what we do with these bundles. Immediately from the compactor they are loaded into railroad cars (gondola type) by means of a bridge crane employing a hairpin hook. Two rows of 10 bundles each are placed along the sides of the cars and one on top down the middle. This gives 60 or more tons per car and makes very fast loading and unloading possible. In many cases we are lifting two bundles per lift and this 4 ton load can be handled rapidly as there are no loose coils on the end of the hook to drop off.

* * *

While all of our original effort was directed to the handling and storing of rod, we soon realized that we could possibly use this method for wire. As soon as we had packaged some of the heavier gauges, we started annealing or spheroidizing these packages. It was possible to increase the furnace load by up to 60 per cent with a very small increase in cycle time. We then started compacting rods for our annealing furnace and have since heat treated many hundreds of tons in this manner. I should say here that there are some furnace dimensions that preclude the savings due to the increased outside diameter of the compacted bundle.

* * *

We were surprised to find that wire could be compressed to about half its original length without damage. We have not as yet completed our study of wire packaging but we understand that some other firms are now using it with some success.

* * *

I will now move back to rod storage and handling of these compact bundles. The bundles can be piled in pyramids to a height of 6 bundles. This requires a base of at least 6 bundles. There are, of course, a great many different combination of piles and a plan must be worked out to suit each storage area. The number of grades has a very great bearing on the average pounds per square foot of floor loading.

* * *

A pile of 5 high, a base of 8 bundles and 10 bundles deep will contain approximately 600 tons. This yields a floor load of approximately 900 pounds less an aisle allowance.

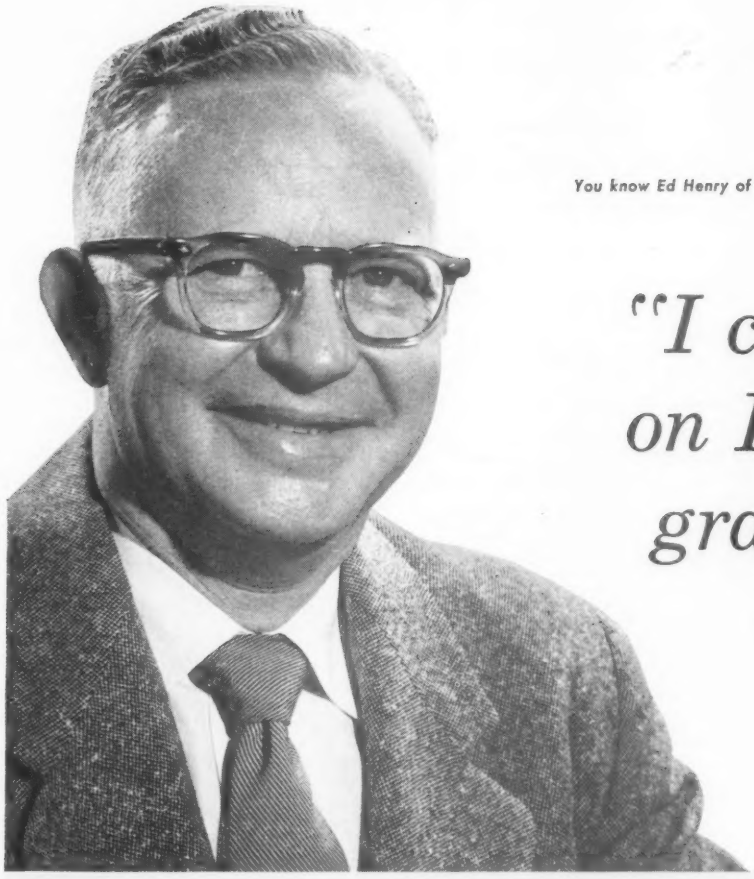
* * *

A pyramid of just three high, three wide and three deep contains 36 tons for a floor loading of 500 lbs less aisle allowance.

* * *

An average of these two piles

(*Please turn to page* 815)



You know Ed Henry of Hedalloy Die Corporation. He says . . .

"I can rely on ELGIN grading"

. . . and precision grading is a must for highly finished work surfaces where scratches cannot be tolerated.

The inset illustration shows the world's largest boltmaker die, made by Hedalloy Die Corporation—one foot long and nearly seven inches in diameter! Because a single scratch during finishing would mean a loss of countless hours of work, Hedalloy specified Elgin Precision Graded DYMO-C* . . . to be sure.

*C for carbide

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Abrasives Division
ELGIN NATIONAL WATCH COMPANY
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Improved Thickness Control of Lead-Sheathed Cable by Ultrasonic Gauge

by Jules Ruskin
Technical Control Supervisor
Montreal Plant
Phillips Electrical Company Ltd.
Montreal, P. Q., Canada

Using a "Vidigage," an electronic ultrasonic gauge, it is possible to measure accurately and continuously the thickness of leadsheath as it is extruded over power and communication cables. Readings can be taken without stopping the lead press and adjustments to maintain thickness within specified limits made as required.

The author graduated in 1942 from McGill University with a B.Sc. degree and in 1946 with a B.Eng. (Elec.). He joined Phillips the same year and has held various positions in testing, production and quality control of wire and cable. He delivered this paper on May 13, 1957, at the Canadian Regional Meeting of The Wire Association in Hamilton, Ontario.

Introduction

Ever since lead extrusion presses were first used to sheath power and communication cables, the cable manufacturer has had the problem of producing sheaths of uniform thickness, without having an exact knowledge of how much variation was actually occurring during his extrusion process. While he could easily gauge the thickness of lead pipe at the start and finish of a cable run using the standard types of micrometers, no simple, accurate gauge had, until recent years, been developed which could measure the wall thickness during the middle of the run.

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The press operator could start sheathing with a uniform pipe and still be reasonably sure of finishing with a pipe of acceptable concentricity, if he maintained his press temperatures as constant as possible. However, when temperature variations occurred or extrusion speed was excessive, the result was an eccentric sheath at the end of the run. One portion of the sheath section could then be too thin to meet specifications, and the cable would have to be stripped of its lead and resheathed.

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In addition to the difficulties of maintaining steady press operating conditions, it is well known that hydraulic ram-type presses exhibit **cyclic** variations in thickness corresponding to the operation cycles or "charges" of this type of press. The operating cycle of a ram-type press consists of

(a) charging the cylinder with molten lead.
(b) allowing up to 10 minutes to cool to a plastic state.
(c) extruding a charge as pipe.
(d) withdrawing the ram and refilling the cylinder, which completes the cycle.

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Sheath thickness falls off from the beginning to the end of an extruded charge and is regained at the start of the succeeding charge, where the cycle is again repeated. Associated with this **reduction** in thickness during the extrusion cycle is an **increase** in the eccentricity, (or range of thickness) and this also follows a cyclic pattern. That is, the sheath regains its uniformity at the beginning of each cycle, only to lose some of it as the charge of lead is extruded. This characteristic pattern of thickness variation is illustrated in Fig. 3.

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The degree of this cyclic eccentricity depends, in large measure, on:

(1) how uniform the sheath was to start with and
(2) how quickly extrusion proceeds. Faster speeds, in general, produce greater eccentricity.

To compensate for these changes in sheath concentricity it is necessary for cable manufacturers to provide additional lead thickness at the start of a run, which means excess lead is required.

Sheath Thickness Gauges

From the foregoing considerations, there would be at least 4 basic advantages in having a gauge to measure sheath thickness during extrusion:

(1) The possibility of saving some of the lead being given away for eccentricity reasons.
(2) The assurance, to the cable user as well as the maker, that the required thickness of lead was present along the entire length of sheath. This is of critical importance in sheathing long lengths of power or telephone cable for under-water installations.
(3) Saving the costs of reworking cables which failed to meet specifications.
(4) As a tool for investigating quickly and accurately any changes in extrusion practices, such as the use of new designs of die blocks, cores and dies.

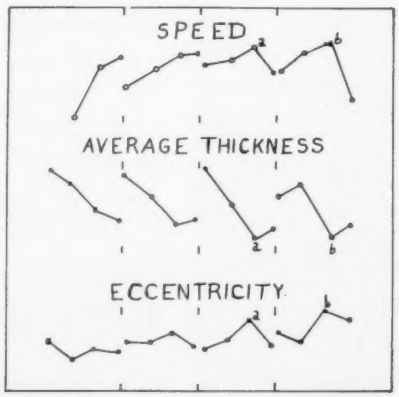

FIG. 3.

Fig. 3—Measurements on four separate charges illustrating cyclic variations of lead thickness.

Cable firms, including many in U.S.A. and Britain, carried out considerable research in developing a thickness gauge but only a handful were, in any way, successful. In addition to the Ultrasonic Gauge, which is the subject of this paper, two other types of thickness indicators are known to have been used.

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One method uses spring loaded rollers containing coils which run along the sheath on four lines at 90° spacing. Current is circulated through the sheath between two points 10 feet apart. The coils, which are balanced in each plane, are used to record the out of balance current, calibrated in mils of eccentricity, on a chart. This method requires about ½ hour to set up and is therefore not economical for routine production.

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A second method takes two gamma-radiographs simultaneously of a cable section in two radial planes at right angles. The radioactive source is cobalt-60 and necessitates safety procedures for the protection of personnel. This method requires about 15 minutes to set up and the press has to be stopped (at the end of a charge) to take thickness readings. Its guaranteed accuracy is within plus 5 mils.

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The thickness gauges just described, while very useful in the sheathing of long lengths of important cables such as submarine cables require considerable setting up and are not as suitable for routine production gauging as the ultrasonic type of gauge in use at Phillips' Montreal plant.

The Ultrasonic Gauge

The complete answer to practical, accurate lead sheath gauging during extrustion was found when the Ultrasonic gauge was introduced. This gauge, known commercially as Vidigage, is made by Branson Instruments of Stamford, Conn., and its principle of operation will now be described. A block diagram, showing the main components of the Ultrasonic gauge, is given in Fig. 4.

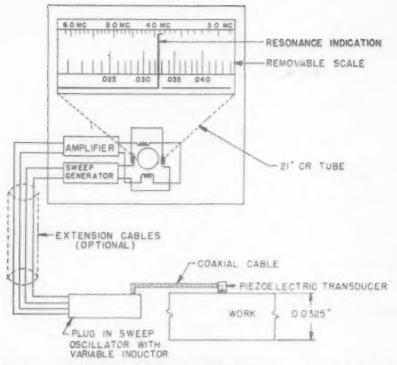

Fig. 4—Vidigage Block Diagram.

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A vibrating piezoelectric transducer or probe, applied to the surface of the lead sheath transmits continuous ultrasonic waves into the material through a thin liquid layer, usually glycerine. An electronic sweep oscillator excites this transducer, which is actually a crystal sandwich of quartz and barium titanate covered with a quartz wearplate, and causes it to vibrate over a range of frequencies generated by the oscillator.

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When the crystal probe vibrates at a frequency equal to or a multiple of the natural resonant frequency of vibration in the metal thickness, there will be a considerable increase in the amplitude of the vibration in the material. This resonance condition produces an increase in the plate current of the oscillator tube. See Fig. 1.

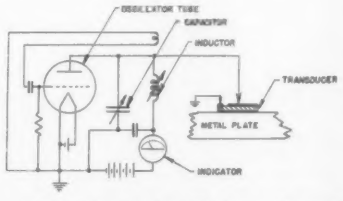

Fig. 1—Basic Circuit for Thickness Gauge Operating on Ultrasonic Resonance Principle.

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The increase in oscillator-plate current produced at resonant frequencies is amplified and applied to the vertical deflection coil of a 21″ Cathode Ray Tube. The horizontal base line of the 21″ tube represents the frequency sweep.

Thickness resonance in the material is indicated by a vertical line on the cathode-ray tube. Calibrated scales placed in front of the tube enable the operator to read the lines **directly** in terms of thickness.

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Resonance indications are obtained at the fundamental frequency and also at multiples of this frequency (Harmonics). See Fig. 2.

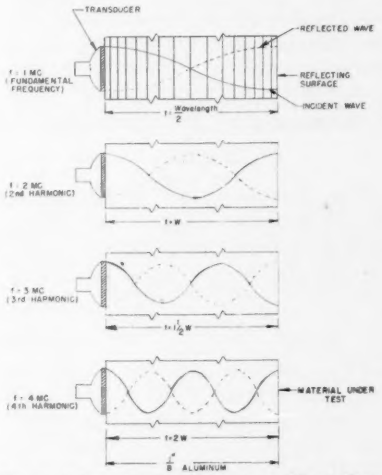

Fig. 2—Ultrasonic Resonance in a Metal Plate.

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The thickness indications are seen clearly up to a distance of 20 feet under normal shop-lighting conditions, as one would watch a TV screen across a room. In Fig. 5, a sample of lead sheath is being checked for thickness and the thickness lines are clearly visible.

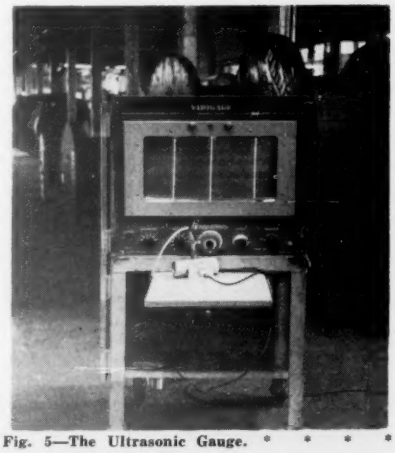

Fig. 5—The Ultrasonic Gauge.

The particular accessories we

use for measuring lead thickness are:

(1) A sweep oscillator of 2-4 megacycles.

(2) A very sensitive type of transducer, which is a sandwich of quartz and barium titanate. This type of crystal is useful at the low ultrasonic frequencies used to transmit through lead.

(3) Three interchangeable thickness scales are available to cover the range of lead thicknesses and cable diameters encountered. In practice, we find that the scale covering the range of 68 to 181 mils is most generally in service.

With the above accessories, thicknesses of 38 to 181 mils can be gauged, the range of cable diameters being .4" to 4" over lead.

Accuracy of the Ultrasonic Gauge

The accuracy and reliability of the ultrasonic gauge was thoroughly investigated by the Laboratory under a variety of conditions.

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They gauged samples of sheath with a standard ½" ball-anvil micrometer and with the ultrasonic gauge Tests were made on sheaths of different alloys, such as 1% antimony-lead and .06% copper-bearing lead. The effect of having different types of insulated cores under the sheath was also assessed, as, for example, metallic-shielded Type H cables, belted power cables, or telephone cables. A statistical analysis of all data was made, and deviations of the ultrasonic gauge readings from micrometer readings were obtained.

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For any of these samples tested, it could be concluded that the accuracy of the ultrasonic gauge, or more correctly, the deviation from micrometer readings, was 1% or better. That is, a 100-mil wall could be gauged to within ± 1 mil. Also, it was determined that this accuracy applied to any sheath irrespective of sheath composition or type of core being sheathed.

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One limitation of the sensitive transducer we use is that its maximum permissable operating temperature is 200°F. Under most extruding conditions, sheath temperatures are well below this temperature, but if necessary, a slight water spray can be provided to meet this requirement.

Using the Ultrasonic Gauge to Control Lead Thickness

The ultrasonic gauge enables us to monitor lead thickness continuously during a cable run, and to take corrective action, when necessary, to adjust thickness to the desired limits.

Fig. 6—The Ultrasonic Gauge in Use at the Press.

Fig. 6 shows the ultrasonic gauge being used by the press operator at one of the 2100-ton hydraulic presses installed in the Montreal plant. The routine for lead gauging and recording the ultrasonic gauge readings is relatively simple, and the press operators can learn to operate the instrument in a very short time. This routine involves the following steps:

(1) Soon after sheathing commences, the ultrasonic gauge probe is swept around the circumference of the sheath, 'exploring' for minimum thickness. The probe is smeared with some glycerine by hand, then pressed against the lead and the operator looks at the thickness lines on the screen. These spot checks are made two or three times per charge extruded and tell the operator if any adjustments are required to overcome thin spots.

(2) At two points in each charge, the ultrasonic gauge data is also recorded on a Thickness form. Four measurements are taken,—the top and bottom portions of the sheath and both sides. The parts of the extrusion stroke at which this is done is the one-third mark and the end of the stroke. This gives the operator a clear picture of any changes in concentricity during the running of a charge.

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Fig. 7 shows typical readings recorded for two press operations, one extruding a copper-bearing lead alloy for power cable, the second extruding a 1%-antimony-lead alloy for telephone cable.

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What happens if thickness shows signs of going out of control? What methods of regaining control are available to the operator? Before discussing these methods, we may briefly review the main features of a hydraulic press fitted with a Glover Tray system of lead charging, a general view of which is shown in Fig. 8.

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These features, starting from the top of the press, are:

(1) The Hydraulic components, cylinder and ram, using either water or oil as a pressure medium.

(2) Below that, the lead pressing ram and a lead cylinder on which sits the Glover Tray. The function of this Tray is as a reservoir of molten lead, assuring that each charge placed in the cylinder is free of impurities and dross and also delivered under vacuum-tight conditions.

(3) Finally the master die block itself, containing the core and die for fixing the dimensions of the extruded pipe. The block is the key part of the press concerned with control of thickness.

The concentricity of the extruded pipe depends chiefly on the accurate positioning of the core relative to the ring die and on the uniform temperature of the metal entering the annulus from all sides.

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The radial adjustment of the die is provided by means of wedge bolts at 90° spacings. Temperature control is provided by an arrangement of gas jets on either side of the die block.

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The average wall thickness of the sheath is regulated by adjusting the distance between core and die by means of the die adjusting nut on the front of the block.

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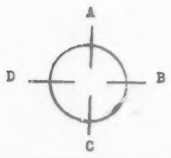
WEEK ENDING
MARCH 1, 1957
SHEET NUMBER.....
Press No. 1

THICKNESS VARIATIONS
DURING LEAD EXTRUSION



OPERATION NUMBER	TYPE OF LEAD	SPECIFIED THICKNESS MILS	CHARGE No.	THICKNESS (MILS)								REMARKS
				1/3 CHARGE				END OF CHARGE				
				A	B	C	D	A	B	C	D	
725	C-B	125	1	132	134	132	130	127	131	125	129	
			2	125	132	125	131	125	124	125	131	
			3	126	131	130	131	125	125	122	127	
			4	126	132	122	130	126	130	121	125	
			5	125	132	117	130	130	137	117	126	
			6	132	138	117	125	125	135	115	128	
			7	125	132	117	135	125	135	125	132	
726	A.C.	105	1	105	108	102	100	105	102	98	108	
			2	108	102	98	105	107	104	99	105	
			3	109	105	99	106	108	105	98	106	
			4	105	108	99	106	105	107	98	104	
			5	107	105	98	104	108	104	97	105	
			6	106	104	99	104	108	105	98	104	
			7	106	105	98	105	107	106	98	105	
			8	106	106	99	106	108	104	97	104	
			9	105	105	99	106	109	105	97	105	
			10	107	105	99	105	109	104	98	106	
			11	105	106	100	104	109	106	98	104	
			12	106	104	100	108	108	107	102	108	

Fig. 7—Typical Thickness Readings During Extrusion.

A close-up view of a die block and its thickness adjustments is shown in Fig. 9.

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Both average wall thickness and concentricity are, as mentioned before, affected by the speed of extrusion, which can thus be used for thickness control purposes.

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The procedure for adjusting lead thickness before sheathing commences, therefore involves 3 separate adjustments.

(1) Adjust die block nut to obtain nominal wall thickness.
(2) Adjust wedge pins to obtain uniform pipe.
(3) Adjust gas jets on die block to equalize temperatures on left and right sides to assure concentricity.

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After the cable has been inserted in the block and sheathing starts, it is not possible to use the wedge pin adjustment any longer, as it is difficult to shift the die radially with a cable inside the pipe.

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If the ultrasonic gauge readings indicate to the operator that the minimum thickness is approaching the specification limit or that eccentricity is too great, he has three methods of adjustment to resort to:

(1) The quickest and simplest method of regaining control is to reduce
(*Please turn to page* 812)

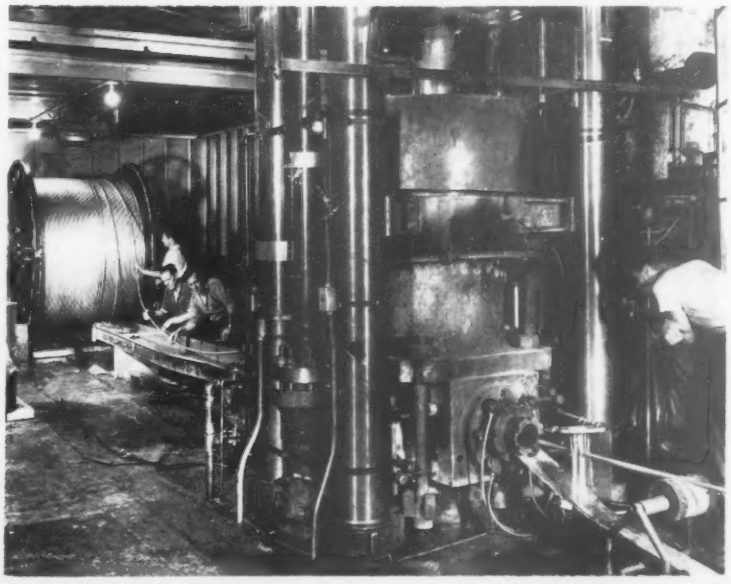

Fig. 8—Glover Tray Lead Press.

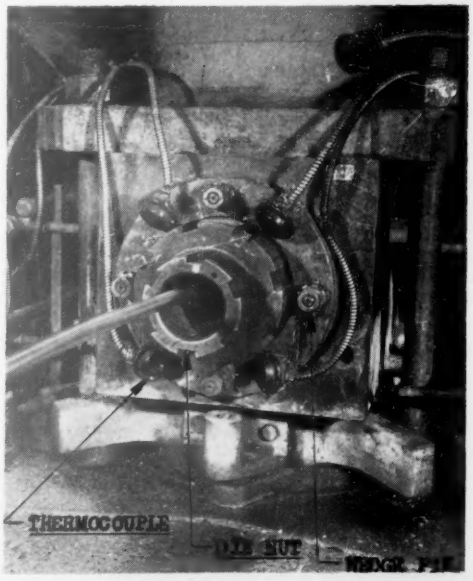

Fig. 9—Master Die Block.

Here's a wire and rod handling system ...that works!

ONE MAN OPERATION—*A ram truck laying stack of coils in trough of new Lee Wilson Hydraulic Machine.*

New, improved Lee Wilson Loading and Stripping machine— proved to cut handling costs...

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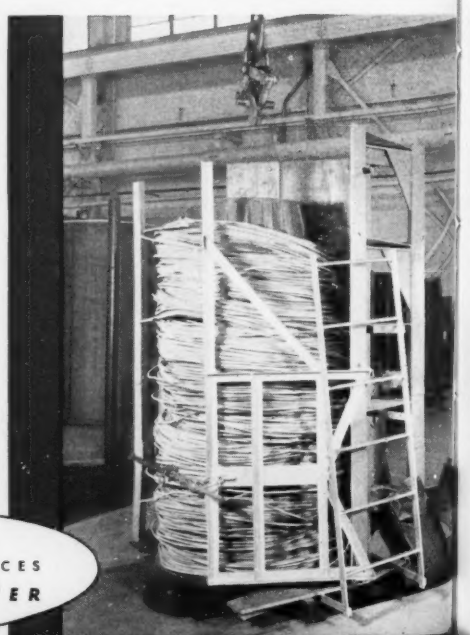

MANUFACTURERS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES

Association Holds Fine Two-Day Regional Meeting in Canada

by Edmund D. Sickels, Editor
Wire and Wire Products
Stamford, Connecticut

The Canadian Regional Meeting of **The Wire Association** was eventful and very worth-while. It was held on May 13th and 14th, 1957, at The Royal Connaught Hotel in Hamilton, Ontario, Canada.

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The meeting got under way officially with the opening of the registration desk at 9:00 A.M., with many people on hand who had arrived in Hamilton on Sunday and early Monday morning.

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Before the meeting was over 245 men had registered for the technical sessions and other activities.

The Directors' Meeting

The semi-annual meeting of the Association's Board of Directors was called to order by **President Tom M. Girdler, Jr.** at ten o'clock with more than a quorum of directors present, in addition to which were various committee heads who had been invited to make reports on their several responsibilities.

★ ★ ★

Executive Secretary, **Richard E. Brown,** read the minutes of the last meeting, which were approved as presented. As Treasurer, he also read the report on the financial status of the Association as of April 1, 1957, the report being duly accepted and approved by the Board.

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J. E. Donnellan was then called upon to present the report of the tellers on the result of the mail votes received on the ballots sent to members on the By-Laws revision approved by the Board at its meeting last October, which revealed that more than two-thirds of the members had approved the changes relating to an increase in the number of directors from 18 to 24 and the other minor alterations.

ALLAN B. DOVE
Program Chairman

★ ★ ★

Mr. Dove was called upon to present a report on the Canadian Regional Meeting in Hamilton, which was then getting under way. A vote of appreciation to Mr. Dove and his committee for their fine work was read into the minutes.

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Earl R. Potter then reported on the Pacific Coast Regional Meeting scheduled for June 13 and 14 in San Francisco. This meeting, he pointed out, embodies an important innovation, as compared with the previous Pacific Coast programs, in that it would be a two-day session, with two symposiums, a plant inspection tour, a banquet and an after-dinner speaker. He urged that as many as possible of the officers and directors be present at this meeting. The good work of the committee who assembled the program, headed by **V. A. Barbata** of the **Bethlehem Pacific Coast Steel Corporation,** was formally recognized by a vote of approval and Mr. Potter was requested to carry back to them a report of this expression of thanks on the part of the Directors.

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Chairman Girdler then called upon **John L. Sanderson,** General Program Chairman, to report on the status of the Annual Convention arrangements. He read and commented on the Ferrous Program and asked **E. D. Bent,** Non-Ferrous Program Chairman, to tell what had been set up for this section in the way of papers. Mr. Bent described what appears to be a program of unusual excellence.

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In the absence of **Eber J. Hubbard,** Chairman of the Entertainment Committee, Mr. Brown reported on the show for the Stag-Smoker Dinner and requested the authorization of the Board to pay for the show that had been planned. This request was duly approved for an expenditure not exceeding $2800.00.

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D. M. Schmid, as Chairman of the Awards Committee, was asked to present the selections for Medal Awards and Certificates of Honorable Mention for the year 1956. The results of his report were published in June in an article titled "The Wire Association's Awards for 1956" and are therefore not duplicated here. The Board duly endorsed the recommendations made by Mr. Schmid's committee.

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Allan B. Dove reported on the

results of the work of the Nominating Committee for Directors, but inasmuch as acceptance from all under consideration had not been finalized, he will make a mail report to Mr. Brown, who will submit the candidates to the Board by mail and then, after their approval, to the membership on a ballot.

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Mr. Girdler brought up the matter of locations of further Annual Conventions, resulting in the choice of Atlantic City for 1958, Cleveland for 1959 and Chicago in 1960. Under a new arrangement, the Association will hold a meeting in Chicago every third year, instead of every other year as has been the practice.

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The question of the issuance of membership certificates to all Association members was discussed and decided against.

★ ★ ★

James E. Flood, as Chairman of the Insulated Wire Section of the Non-Ferrous Division, reported that with the increase of the number of directors drawn from among the electric wire and cable members, his committee would be able to accomplish much more in its service to members from this branch of the wire industry.

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Mr. Dove brought up the question of having the membership listed in the yearbook section of the Wire and Wire Products Buyers' Guide by companies as well as alphabetically by individual name. After some discussion, the Board approved the action and authorized the Secretary to charge the extra expense to the Association.

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Mr. Girdler was asked to go into the matter of the renewal of the expiring contract between the Association, the **Quinn-Brown Publishing Corporation** and **Richard E. Brown.** Mr. Brown pointed out and read from the By-Laws the provision covering this, expressing his opinion that the By-Laws provision made a contract unnecessary. The matter was deferred for further consideration at the October meeting.

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A motion was made, seconded and passed to ratify the acts of the Officers and Directors for the period covered by the report of the Secretary-Treasurer presented at the outset of the meeting.

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There being no further business, the meeting was formally adjourned at 12 o'clock noon.

The Directors Luncheon

This pleasant, traditional luncheon, preceded by refreshments, is tendered following a directors' meeting to the committeemen and those who are scheduled to present papers, to provide an opportunity for those participating in any particular meeting to become personally acquainted with the officers and directors of the Association.

The Technical Sessions
Monday, May 13, 1957

The technical sessions opened at 2:30 P.M. in the Sheraton Room with two papers of general interest to all. **Thomas R. Jopling,** Assistant Works Manager, **Canadian Tube and Steel Products Ltd.,** served as Chairman of the Meeting.

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The first paper, "Rod Packaging," was presented by **J. S. Laver** of the **Steel Company of Canada Ltd.** This paper described experimental work that has led to bundling of rods in packages to reduce space and procedures to reduce heat treating, handling and freight costs.

★ ★ ★

G. V. Globe of the **B. Greening Wire Co. Ltd.** next presented a paper entitled "Some Aspects of Quality Control," in which he outlined the quality control studies that have reduced material and scrap costs in a novel manner that has brought management and labor together as a cooperating force for quality control.

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Following the delivery of these papers of broad interest, the session was adjourned briefly so that simultaneous ferrous and non-ferrous meetings could be held.

The Ferrous Session

Those who wanted to attend the ferrous meeting remained in the Sheraton Room for the session. Mr. Jopling carried on as Meeting Chairman. The meeting got under way at 3:30 P.M. Two papers were given.

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Ralph D. Hindson, Steel Company of Canada Ltd., delivered a talk on "Capped Steels", in which he discussed the metallurgical aspects of this steel, which is rapidly gaining in use for wire rods destined for wire product applications.

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The second paper, "Stainless Steel Spring Wire", was presented by **John F. Trant** of **Atlas Steels Ltd.** This paper was devoted to quality alloy steels for spring wire applications.

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It was followed by a motion picture called "Ingot Steels", which was a part of Mr. Hindson's presentation.

Non-Ferrous Session

James E. Flood, Chief Chemist, **Plastic Wire and Cable Corp.** and Vice President of the Association, served as chairman of this session which opened at 3:30 P.M. in the Oriental Room. Three excellent papers were given.

★ ★ ★

The first, "Aluminum Magnet Wire," was presented by **J. G. Moher, Canadian General Electric Co. Ltd.** It embodied the result of recent studies at C.G.E. on this important product.

★ ★ ★

Dan Boyd of the Metallurgical Department, Cable Engineering Laboratories, Wire and Cable Div., **Northern Electric Co. Ltd.** at Lachine, Quebec, delivered a paper, "Metals in Communication and Power Transmission." The author dealt with the use in Canada of non-ferrous metals utilized in particular applications for which special cables were designed for spe-

cial jobs, such as submarine power cables, mineshaft power cables, etc. The presentation closed with the showing of a new film depicting typical Canada Power Transmission projects.

* * *

Another paper in the session was given by **Jules Ruskin, Phillips Electric Co., Ltd.,** Montreal, of which company he is Technical Control Supervisor. His unusual subject, "Improved Thickness Control of Lead Sheathed Cables by Ultrasonic Gauge," was a factual report resulting from extensive trials of an electronic gauge that continuously registered wall thicknesses, enabling corrective adjustments to be made without stopping the lead press.

The Cocktail Party

Preceding the dinner, a pleasant forty-five minutes was spent in the Sheraton Room during which refreshments were served.

View in Parkdale Works' wire drawing department showing Motobloc with straightening and pointing equipment. * * * * * *

The Dinner

At seven o'clock the doors to the Sheraton Room were opened for the dinner program, attended by over 330 members and guests. The room, as might have been expected, was colorfully decorated and the dinner left nothing to be desired and was made more pleasant by the presence of the ladies who had accompanied men to the meeting, some 40 being present. An orchestra provided music preceding and throughout the dinner, adding much to the pleasurable atmosphere of the evening.

* * *

When things had been cleared away, **Allan B. Dove**, Chairman of the Program Committee, acting as master of ceremonies, welcomed the gathering to the meeting and to Hamilton. Mr. Dove introduced the gracious and charming **Mrs. Ada Pritchard,** Acting Mayor of Hamilton, who extended an official greeting and welcome to Hamilton, the "Pittsburgh of Canada."

* * *

Tom Girdler, Jr., as President of The Wire Association, also spoke briefly and expressed his pleasure at the large attendance at this Canadian Regional Meeting.

* * *

Mr. Dove called upon **Lawrence Atkinson,** Vice President of **Frost Steel and Wire Co. Ltd.,** to introduce the principal speaker of the evening, Dr. John Fisher, well-known and highly popular lecturer and radio and TV commentator. His dynamic and colorful talk portrayed the status of Canada with respect to England and the United States, dwelling particularly upon the friendly and peaceful relationship between our countries. His talk, highly informational and inspirational, was received with a spontaneous standing ovation of applause. Dr. Fisher is affectionately known throughout both Canada and the United States as "Mr. Canada."

The Plant Inspection Trips Tuesday, May 14, 1957

Those attending the Regional Meeting were provided with an opportunity to see three interesting wire mills.

Tour of Parkdale Works

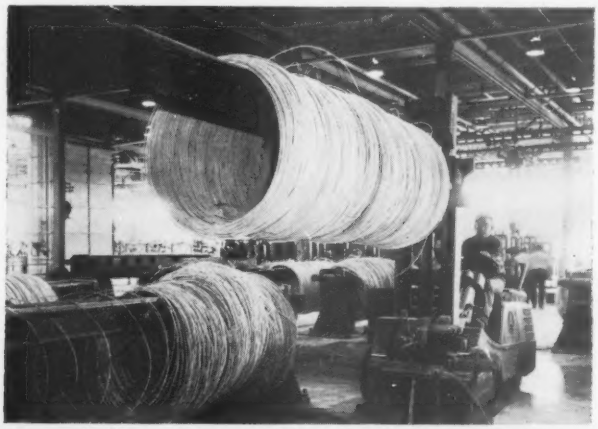
Busses left the hotel between 9:00 and 9:30 A.M. for the Parkdale Works of the **Steel Company of Canada Ltd.** This mill, now about a year and a half old, is the very last word in layout and equipment. It literally sparkled in its newness.

* * *

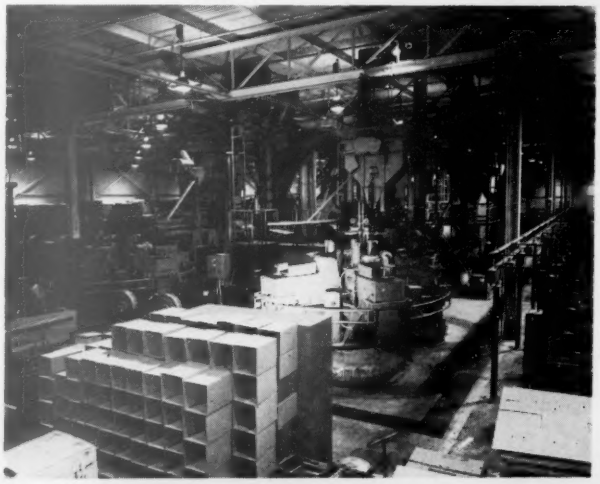
A marked line for the guests to follow had been laid out, with Steelco employees stationed at strategic points along the way to answer questions.

* * *

The guests started at a point where they were able to see a large



Above: Handling large coils in Steelco's Parkdale Works at Hamilton. *



Right: Automatic nail packaging in the Parkdale Works. * * * *

strand annealing furnace heat-treating green high carbon steel rods destined for tire bead wire use.

* * *

Following this, they proceeded through the extensive cleaning house, which was notably free from acid fumes. It was a typical straight-line arrangement, equipped with a gantry crane, three acid tubs of 9000 gallons each and two flash bakers.

* * *

A point of interest next visited was a battery of Vaughn wire drawing machines used for producing the spiral wire employed for the making of the Ardox nails, on which subject **Allan B. Dove** gave the Medal Award paper at the Regional Mecting in New York in April, 1955. Equipment included both single block and continuous machines.

* * *

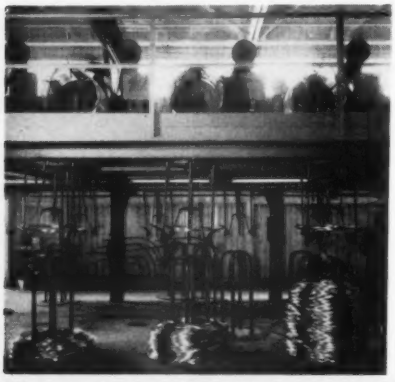
One of the features of the Parkdale Works was a 36-strand hot dip galvanizing unit, the interest of the visitors centering upon the Breitenbach dead take-up. In this machine the coils remained stationary, the wire being wound upon the take-ups by a revolving serving apparatus. After a predetermined amount of galvanized wire had been amassed, it was automatically discharged onto one ton accumulators on the floor below it.

* * *

An extensive battery of Glader nail machines, for from spike sizes to brads, was busy turning out nails. Adjacent to this were galvanizing and blueing barrels and a large Ransohoff automatic cleaning and packaging unit. There were, of course, many other attractions, such as the 8 shipping bays equipped with hydraulic loader docks, large enough to keep trucks under cover while loading. All in all, the mill was a pleasure to see and was thoroughly enjoyed by the 153 persons who took this trip.

* * *

Following this tour, the group was returned to the hotel for a tasty buffet luncheon in the Crystal Room, which was served through the courtesy of **The Steel Company of Canada.**



Take-up end of Parkdale Works galvanizing equipment showing take-ups at top and accumulators below. * * * * * * *

The Federal Tour

At 1:30 busses transported 61 persons interested in a non-ferrous wire mill to Guelph where they were conducted through the fine, modern mill of the **Federal Wire and Cable Division** of the **H. K. Porter Co., Ltd.** where they were shown the Laboratory, the assembly of automotive harness, the Magnet Wire Department, in which rolling and enamelling of square and rectangular wire was seen, the Round Wire Enamelling, and the Extrusion departments, where rubber and plastic insulation materials are applied to wire to form electric conductors.

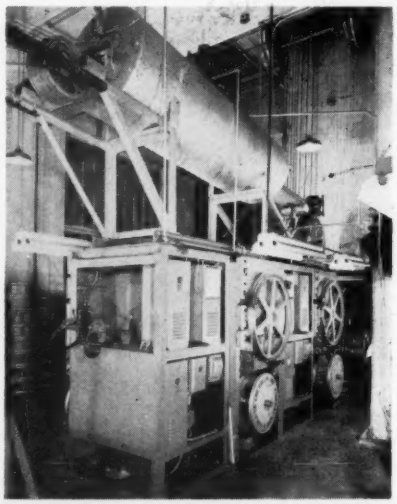
* * *

Insulating equipment included a continuous vulcanizer, braiding, knitting and finishing machines. One of the points of interest was the electro-tinning line, about which Federal's **M. K. Schurter** had much to say in a paper delivered at the 1956 Annual Convention in Pittsburgh jointly with **R. T. Gore** of the **Metal and Thermit Corp.**

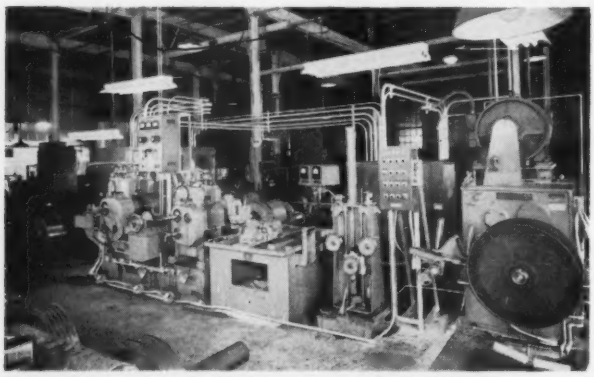
* * *

The Magnet Wire Department applies the regular coverings and combinations of coverings of cotton yarns, paper and tapes, as well as the production of various types

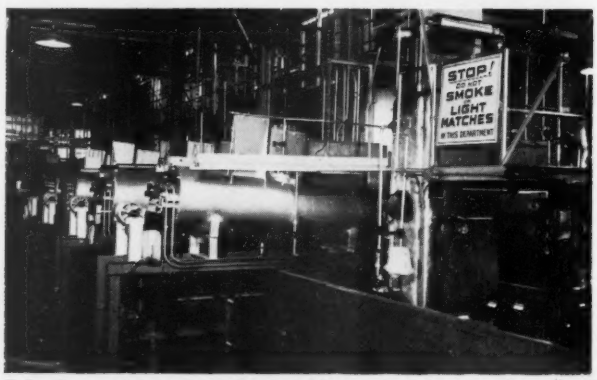
(*Please turn to page* 809)



Rectanguiar and square wire enameling machines at Federal Wire and Cable. * * * * *



Federal's flat mill for producing square and rectangular wire. * *



Federal's round wire enameling machines. * * * * * *

ADJUSTABLE DRAW-CAST DIE BOX
FOR WET OR DRY DRAWING

The new Coulter & McKenzie ADJUSTABLE DRAW-CAST DIE BOX with true center-line pivotal action takes *all* the guesswork out of wire casting! You can *quickly* and *positively* establish the desired loop diameter and pitch of your wire with just 2 simple adjustments.

LOOK AT THESE ADVANTAGES:

1. Positive Adjustable Control of cast and pitch.
2. Completely eliminates or greatly reduces skilled use of casting rolls.
3. Positive locking of controls and die insures uniform constant cast, coil after coil.
4. Graduated indication permits keeping records for quality control and duplication when changing sizes or analysis.
5. Easy to install on most types of wire drawing equipment.

MODEL NO.	MAX. DIE SIZE CASING O.D.	NET WEIGHT	DIMENSIONS			
			A	B	C	D
1	1"	8 lbs.	2 5/8"	4"	6"	4 1/2"
2	1 1/2"	14 lbs.	2 7/8"	4 1/2"	6 1/2"	5"
3	2"	125 lbs.	7 1/4"	10 1/2"	9 1/2"	12 1/2"

Model No. 3 (Illustrated) may be arranged for direct water cooling of die casing.

U.S. and foreign patents applied for.

35 UNION AVENUE

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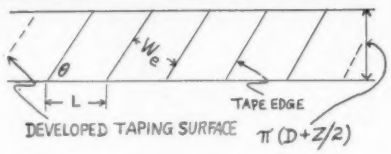
An Elementary Mathematical Treatment of Cable Taping

by Sam Kalifon, B.Ch.E.
Product Engineer
Hatfield Wire and Cable Division
Continental Copper and Steel Industries, Inc.
Hillside, New Jersey

The author presents in this article the results of his studies on methods of calculating by mathematics the proper application of tape to cable.



Legend

We = Effective width of tape, inches
= W—Q, for taped applications
= W+Q, for spaced applications
= W, for butt applications
Q = Lap or spacing, inches
L = Lay, inches
D = Diameter of cable being taped, inches
Z = Average increase over D resulting from taping, inches
D + Z/2 = Average pitch diameter of taped surface, inches
D + Z = Average diameter of taped surface, inches
θ = Thickness of tape, inches
t = Thickness of tape, inches
W = Width of tape, inches

The Analysis of Tape Overlap

It is desirable, at the outset, to inquire into the value of delta, the overlap, since this symbol will appear in many of the equations developed in connection with this study. Accordingly, delta, in what follows, will be determined as a function of the independent variables, t, W, and Q.

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If the thickness of tape being used is t, then the OD over a taped cylinder where there is no tape overlap, i.e., butt application, must be D + 2 t. However, in the most usual case, there is an overlap over some fractional part of the tape width. If this overlap is Q and the tape width W, then, since there are 2 overlaps for every tape width, there is a total increase of 2t over that portion of tape having a length of 2Q and none over that portion having a length of W - 2Q. Hence:

$$Z = 2t(W-2Q) + 4t(2Q)/W$$

$$= 2t(W-2Q)/W + 4t(2Q)/W$$

$$= (2t/W)(W-2Q + 4Q)$$

$$\text{or } Z = 2t \cdot \frac{W + 2Q}{W}$$

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There are tabled below the values of the coefficient (W + 2Q)/W for a number of values of overlap, and of tape width. The table, for all ordinary cases of lapped tape application, facilitates the determination of delta, here symbolized by Z.

Notes pertaining to preceeding table:

(a) To obtain the increase in diameter of a cylinder, as a result of applying a tape, t inches in thickness, multiply 2t by the coefficients appearing in this table. Thus, a 1.0" tape applied with a ⅜" overlap, having a thickness of .010" would result in an increase of Z = .020 × 1.750 = .035".

(b) To obtain the effective tape thickness with respect to build-up, multiply t by the coefficient taken from this table.

(c) The value of the coefficient is restricted to a maximum of 2, implying that the overlap is never greater than 50%. If it were there would be areas where overlap upon overlap appeared. Unless such a condition were specifically required, such an application would be economically unsound since the use of a wider tape and a smaller overlap is indicated.
In addition, the appearance of multiple overlap raises unnecessarily the average OD of the taped cable so that more jacket-

W	Overlap - Inches							
	1/8	1/4	3/8	1/2	5/8	3/4	7/8	1
	Coefficient - (W + 2Q)/W							
3/8	1.667	-	-	-	-	-	-	-
1/2	1.500	2.000	-	-	-	-	-	-
5/8	1.400	1.800	-	-	-	-	-	-
3/4	1.333	1.667	2.000	-	-	-	-	-
7/8	1.286	1.572	1.857	-	-	-	-	-
1	1.250	1.500	1.750	2.000	-	-	-	-
1 1/4	1.200	1.400	1.600	1.800	2.000	-	-	-
1 1/2	1.167	1.333	1.500	1.667	1.833	2.000	-	-
1 3/4	1.143	1.285	1.429	1.571	1.714	1.857	2.000	-
2	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
2 1/4	1.111	1.222	1.333	1.444	1.556	1.667	1.778	1.889
2 1/2	1.100	1.200	1.300	1.400	1.500	1.600	1.700	1.800
2 3/4	1.091	1.182	1.273	1.364	1.455	1.545	1.636	1.727
3	1.083	1.166	1.250	1.333	1.417	1.500	1.583	1.667
3 1/4	1.077	1.154	1.231	1.308	1.385	1.462	1.538	1.615
3 1/2	1.071	1.142	1.214	1.286	1.357	1.429	1.500	1.571
3 3/4	1.067	1.134	1.200	1.267	1.333	1.400	1.467	1.533
4	1.063	1.126	1.188	1.250	1.313	1.375	1.438	1.500

ing compound would be required to cover the cable assembly than would otherwise be necessary, for a specified jacket wall.

The Taping Angle, θ

From the figure, for lapped applications,

$$\text{Sin } \theta = W_e/L$$

$$\text{Tan } \theta = \pi(D+Z/2)/L$$

$$\text{Sin } \theta/\text{Tan } \theta = \text{Cos } \theta$$

$$= (W_e/L) \cdot L/\pi(D+Z/2)$$

$$\text{or, Cos } \theta = W_e/\pi(D+Z/2) \qquad (A)$$

★ ★ ★

In terms of the independent variables, then, expression (A) becomes:

For Butt Applications,

$$\text{Cos } \theta = W/\pi(D+t) \qquad (B)$$

For Spaced Applications,

$$\text{Cos } \theta = \frac{W+Q}{\pi\left[D+t \cdot \frac{W}{W+Q}\right]} \qquad (C)$$

For Lapped Applications,

$$\text{Cos } \theta = \frac{W-Q}{\pi\left[D+t \cdot \frac{W+2Q}{W}\right]} \qquad (D)$$

★ ★ ★

Equations (B), (C), and (D) are obtained from equation (A) by making the following substitutions:

$W_e = W$,
and $Z/2 = t$ to obtain (B)
$W_e = W+Q$,
and $Z/2 = t \cdot W/(W+Q)$
to obtain (C)
$W_e = W-Q$,
and $Z/2 = t \cdot (W+2Q)/W$
to obtain (D).

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In the table that follows, the value of θ is given for values of W_e and $D + Z/2$, for lapped constructions (see table at right).

Length of Tape Lay, L

The lay of tape is defined as the distance in inches between successive like edges of the helically applied tape. See L in the figure. Under "Taping Angle" it was shown that

$$\text{Sin } \theta = W_e/L$$

$$\text{Whence, } L = W_e/\text{Sin } \theta$$

Since the values of both W_e and θ are always either known or determinable from the basic data available in connection with any taping problem, L is likewise known or determinable.

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If the value of L must be established in terms of the independent variables, the equations below, though cumbersome, may be used:

For Butt Applications:

$$L = \frac{\pi W(D+t)}{\sqrt{\pi^2 (D+t)^2 - W^2}} \qquad (B)$$

For Spaced Applications:

$$L = \frac{(W+Q) \cdot \pi\left[D+t \cdot \frac{W}{W+Q}\right]}{\sqrt{\pi^2\left[D+t \cdot \frac{W}{W+Q}\right]^2 - (W+Q)^2}} \qquad (C)$$

For Lapped Applications:

$$L = \frac{(W-Q) \cdot \pi\left[D+t \cdot \frac{W+2Q}{W}\right]}{\sqrt{\pi^2\left[D+t \cdot \frac{W+2Q}{W}\right]^2 - (W-Q)^2}} \qquad (D)$$

Length of Tape per 1000 Feet of Cable, λ

In 1000 feet or 12000 inches of cable, there are 12000/L tape edges, counting only one of the pair of edges naturally associated with any tape width. Each tape edge is $\pi (D + Z/2)$ inches long. Accordingly, the total length of tape per 1000 feet of cable is the product of both these factors, i.e.,

$$\lambda = \frac{12000}{L} \cdot \frac{\pi(D+Z/2)}{\text{Sin } \theta}$$

$$\text{but } \pi(D+Z/2)/L = \text{Tan } \theta$$

$$\lambda = 12000 \text{ Tan } \theta / \text{Sin } \theta$$

$$= 12000 / \text{Cos } \theta \text{ inches}$$

$$\text{or, } \lambda = 1000 \text{ Sec } \theta \text{ feet / 1000' Cable}$$

★ ★ ★

Accordingly, to find the length of tape used, it is merely necessary to consult a table of trigonometric functions to determine the secant value of the taping angle, and then to multiply this value by 1000. On

(*Please turn to page* 818)

$\theta = W_e/\pi(D+Z/2)$

D+Z/2	W_e, Inches										
	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75
	θ, Degrees										
.100	36°30										
.125	50°50										
.150	57°58										
.175	62°47	23°50									
.200	66°41	37°39									
.225	69°17	44°59									
.250	71°26	50°28	17°16								
.275	73°11	54°38	29°46								
.300	74°37	57°58	37°16								
.325	75°50	60°41	42°44	11°39							
.350	76°50	62°57	47°0	24°34							
.375	77°45	64°54	50°28	31°55							
.400	78°31	66°33	53°21	37°16	5°54						
.425	79°12	68°0	55°49	41°31	20°35						
.450	79°49	69°17	57°58	44°59	27°51						
.475	80°21	70°25	59°50	47°55	33°6						
.500	80°51	71°26	61°29	50°28	37°16	17°16					
.525	81°17	72°11	62°57	52°41	40°43	24°34					
.550	81°41	73°11	64°16	54°38	43°40	29°46					
.575	82°3	73°56	65°28	56°23	46°12	33°51	14°21				
.600	82°23	74°37	66°33	57°58	48°28	37°16	21°49				
.625	82°41	75°15	67°33	59°23	50°28	40°11	26°58				
.650		75°50	68°27	60°41	52°15	42°44	31°1	11°39			
.675		76°22	69°17	61°52	53°53	44°59	34°23	19°25			
.700		76°51	70°4	62°57	55°22	47°0	37°16	24°38			
.725		77°19	70°46	63°57	56°43	48°49	39°48	28°35	8°57		
.750		77°45	71°26	64°53	57°57	50°27	42°1	31°54	17°13		
.775		78°9	72°3	65°45	59°7	51°58	44°3	34°46	22°28		
.800		78°31	72°38	66°33	60°11	53°21	45°52	37°16	26°28	5°54	
.825		78°53	73°11	67°18	61°10	54°38	47°32	39°30	29°46	15°18	
.850			73°41	68°0	62°5	55°49	49°3	41°30	32°35	20°35	
.875			74°10	68°40	62°57	56°56	50°28	43°19	35°4	24°34	
.900			74°37	69°17	63°46	57°58	51°46	44°59	37°16	27°51	13°26
.925			75°3	69°52	64°31	58°55	52°58	46°30	39°16	30°31	18°52
.950			75°27	70°25	65°14	59°50	54°6	47°55	41°4	33°6	22°52
.975			75°50	70°57	65°55	60°41	55°9	49°14	42°44	35°18	26°8
1.000			76°11	71°26	66°33	61°29	56°9	50°28	44°16	37°16	28°55
1.025			76°32	71°55	67°10	62°14	57°5	51°36	45°41	39°4	31°23
1.050				72°21	67°44	62°57	57°58	52°41	47°0	40°43	33°31
1.075				72°47	68°17	63°38	58°47	53°41	48°13	42°15	35°29
1.100				73°11	68°48	64°16	59°35	54°38	49°23	43°40	37°16
1.125				73°34	69°17	64°53	60°19	55°32	50°28	44°59	38°55
1.150				73°56	69°45	65°28	61°2	56°23	51°29	46°13	40°26
1.175				74°17	70°12	66°1	61°42	57°12	52°27	47°22	41°50
1.200				74°37	70°38	66°33	62°20	57°58	53°21	48°28	43°10
1.225				74°56	71°3	67°3	62°57	58°41	54°13	49°29	44°24

Coming in October . . .

THE ANNUAL CONVENTION
OF
THE WIRE ASSOCIATION
October 14-17, 1957, LaSalle Hotel, Chicago, Ill.

THE PROGRAM

A fine series of technical papers has been provided for men in the Ferrous and Non-Ferrous Divisions of the Association that are timely and authoritative.

Steel men will hear five papers on various phases of heat treating, four on wire drawing and packaging, four on wire problems and a symposium on wire cleaning and plating.

Non-Ferrous mill men will be given a full schedule of papers on extrusion equipment, insulating materials, wire drawing, stranding, diameter control and other pertinent subjects.
In connection with these sessions, appropriate new motion pictures will be shown.

Other features will be the Annual Luncheon, at which the Mordica Memorial Lecture will be presented, the Stag Smoker-Dinner with its fine show, the Annual Meeting of members and plant inspection tours of American Steel and Wire's Joliet mills and Revere Copper and Brass's Chicago works.

All persons active in the wire industry are welcome and are cordially invited to attend.

We hope you will make your plans now to be in Chicago for this Convention.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET STAMFORD, CONN.

"Kel-F"* 500, A New Fluorocarbon Wire Insulating Material

by Jules A. Jupa
Sales Engineer
The M. W. Kellogg Company
Chemical Manufacturing Division
Jersey City, New Jersey

Mr. Jupa delivered this paper at the Fifth Annual Signal Corps Wire Cable Symposium at Asbury Park, N. J., on December 4, 1956.

"KEL-F" plastic, a high polymer of monochlorotrifluoroethylene, became established as a wire insulating material as a result of the active development work of the Signal Corps, which resulted in a specification, MIL-W-12349 (Nov. 25, 1952), written around this material. This specification essentially established "KEL-F" plastic as a material that could be used at 135°C. continuously. The Signal Corps Engineering Laboratories felt that the full potential of this material was not completely realized with the establishment of the above mentioned specifications. They recommended further investigation to develop and improve the performance of polychlorotrifluoroethylene for continuous use at temperature above 135°C. This work was done by a well known wire coating company under contract with S.C.E.L.

★ ★ ★

We, at The M. W. Kellogg Company, have known that "KEL-F" plastic, when molded or extruded under conditions to retain its high molecular weight, can withstand continuous exposure to temperatures as high as 200°C. So far, in the existing extrusion methods for coating wire with "KEL-F" plastic, the degree of thermal breakdown was great enough to limit "KEL-F" plastic for continuous use to 135°C. or below. Fully cognizant of the high temperature potential which exists in our material, research and development efforts were pursued along these lines. The product, which was a culmination of this work, was "KEL-F" 500, a material able to withstand continuous use at 150°C. and 175°C. when applied as insulation on wire.

* "Kel-F" is The M. W. Kellogg Company's registered trademark for its fluorocarbon products.

Material Description

The improved heat aging characteristics have been achieved by an architectural modification along the polymer chain, which limits crystalline growth even though the same degree of thermal degradation is encountered in the extrusion process as with our "KEL-F" grades 270 and 300 materials. "KEL-F" 500 is produced in two grades, namely, 500-F and 500-R. The "F" grade is considered more flexible and is recommended for wire insulation work. The "R" grade is a more rigid material and is generally recommended where greater stiffness at higher temperatures is required. These materials are supplied in the form of the conventional molding powder pellets and as a low density powder. They may be obtained in various molecular weight ranges as required for specific fields of application. The compression ratio of the high density molding powder or pellets is roughly 2 to 1, whereas, the compression ratio of the low density powder is approximately 6 to 1. For the most part, high density molding powder is used for extrusion work which requires a clear, transparent coating. The low density powder is supplied to extruders who may wish to do their own coloring. "KEL-F" 500-F and R are essentially pure polymeric materials which contain no modifying agents such as plasticizers and other ingredients.

Physical Properties

As you must have gathered, there has been constant reference to crystallinity and its effects on the heat aging characteristics of the insulated wire. "KEL-F" plastic, being an essentially crystalline polymer, can exist in an amorphous and crystalline form. The rate of crystal growth is, to a great extent, a function of the molecular weight and its thermal history. Minor degradation during extrusion will result in a product that has good heat aging properties. However, in normal extrusion procedures, there is considerable degradation, which permits a greater mobility of the molecules and rapid crystallization and embrittlement at temperatures of 150°C. or above. "KEL-F" 500 was developed primarily to overcome this limitation.

★ ★ ★

Figure I illustrates the effect of heat aging on a sample of regular "KEL-F" plastic, grade 300 and "KEL-F" 500-F when exposed to the same temperatures for the period of time indicated. You will note that the "KEL-F" 500-F shows a much lower degree of crystallinity than the regular "KEL-F" plastic. The relative molecular weight of both samples was roughly equivalent to the values obtained from production samples of "KEL-F" plastic insulation.

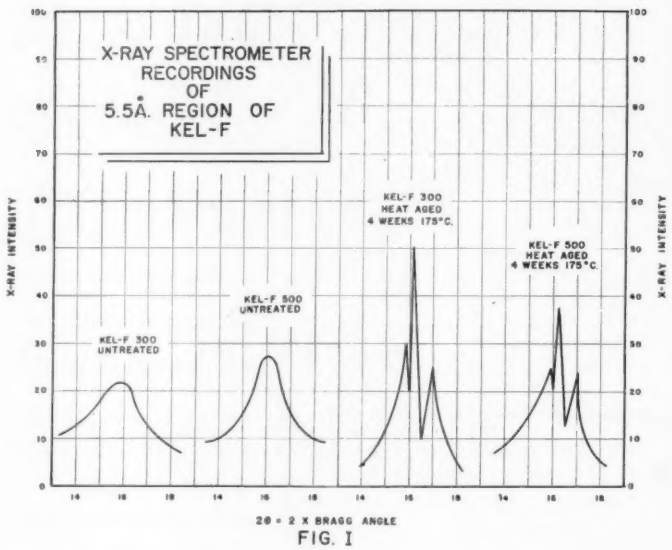
★ ★ ★

Table I shows a comparison between the physical properties of

TABLE I

COMPARISON OF PHYSICAL PROPERTIES OF "KEL-F" 500 AND "KEL-F" 300

	"KEL-F" 300	"KEL-F" 500
Specific Gravity (D-792-48T)	2.12	2.10
Tensile Strength (D-638), 25°C., psi	4,000-5,000	4,500
Yield Point (D-638), 25°C., psi	4,500-5,000	4,000
% Elongation (D-638), 25°C.	125 - 175	150 - 180
Impact Strength - Izod (D-256), ft.lb./in. notch	3 - 5	No break with 30 lb. hammer
Hardness, Shore D (D-676), 25°C.	77	73
Flame Resistance	Non-flammable	Non-flammable
% Water Absorption (D-570)	0.00	0.00
Dielectric Constant, 25°C. - 10^6 cps	2.29	2.27
10^7 cps	2.40	2.36
10^8 cps	2.39	2.37
Loss Factor at 25°C. - 10^6 cps	0.0058	0.0082
10^7 cps	0.0063	0.0078
10^8 cps	0.0040	0.0048
Volume Resistivity (D-257), Ohms/cm.	$>10^{16}$	$>10^{16}$
Surface Resistivity (D-257), Ohms/cm. (50% RH, 25°C.)	$>10^{15}$	$>10^{15}$
Radiation Resistance	Embrittles at 8 megareps	Embrittles at 24 megareps


X-RAY SPECTROMETER RECORDINGS OF 5.5Å. REGION OF KEL-F
KEL-F 300 UNTREATED
KEL-F 500 UNTREATED
KEL-F 300 HEAT AGED 4 WEEKS 175°C.
KEL-F 500 HEAT AGED 4 WEEKS 175°C.
X-RAY INTENSITY
2θ = 2 X BRAGG ANGLE
FIG. I

"KEL-F" 500 and "KEL-F" 300. There is virtually no difference insofar as the standard physical, chemical and electrical properties are concerned. In essence, "KEL-F" 500 offers greater resistance to crystallinity, higher impact strength, greater clarity, greater resistance to gamma and beta radiation and improved flexibility.

Extrusion Technique

Wire coating work with "KEL-F" plastic has been done on all standard types of American extruders, sizes from 1-1/2", 2-1/2" and 3-1/2" have been used. Generally, the 1-1/2" and 2-1/2" machines are employed. Electrically heated units are preferred because of the higher temperatures required along the length of the barrel and in the dies. Much of our experimental work on "KEL-F" 500-F has been performed on our 1-1/2" Modern Plastic machine, with a 16 to 1 effective barrel length. The same extruders, dies and accessory equipment that have been used on regular "KEL-F" 270 and 300 can be used for the extrusion of "KEL-F" 500-F. Figure II illustrates schematically the layout of the extruder and supplementary equipment that were used experimentally for the wire coating runs. The barrel was heated in three separate zones, with each zone being individually controlled with a 3,000 Watt band heater. These zones are identified at T_1, T_2, T_3 in Figure II.

Screw

A screw, having an effective length of 24-5/8", a 3.6 compression ratio and a metering section consisting of four flights near the tip of the screw with a depth of 0.090" was used. This screw had a constant pitch with increasing route diameter to the metering section. Material of construction was chromium plated steel.

* * *

Die

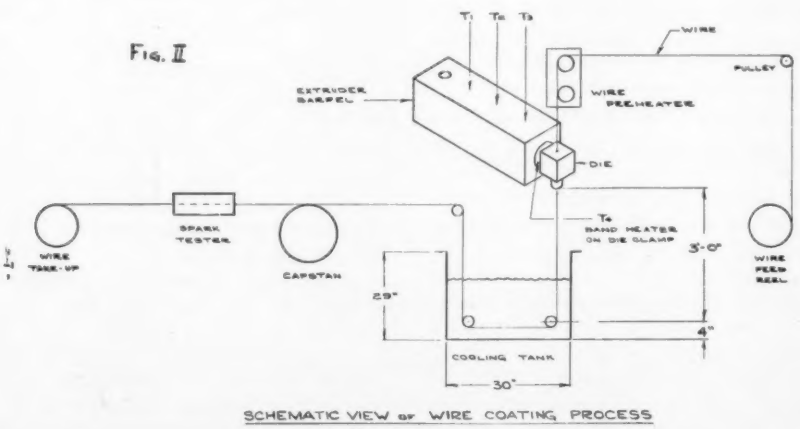
For the most part, the tube-on technique was used in coating experiments, with die mounted in a vertical manner. The approximate length of the cone was six inches and the distance from the die to the surface of the water in the cooling tank below was approximately 18 inches. Figure III shows the general construction and critical dimensions of the die with the three separate heating zones identified as T_5, T_6, and T_7. A high grade chrome-nickel steel was used for die construction.

Operating Conditions

Many experimental runs were made in the equipment described

(*Please turn to page* 817)

FIG. II



SCHEMATIC VIEW OF WIRE COATING PROCESS

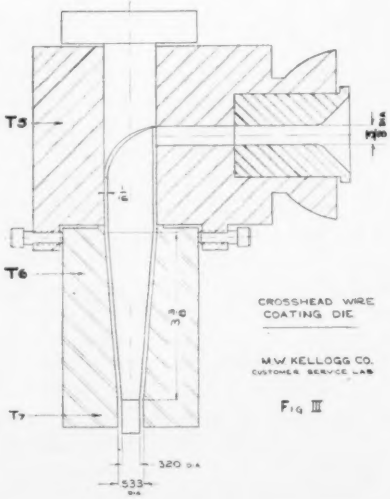


FIG. III

Government Wire Production Information

New Standards Publication

Standard Samples and Reference Standards issued by the **National Bureau of Standards,** National Bureau of Standards Circular 552 (second edition), 24 pages, 25 cents. (Order from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.) The Circular is also available without charge to prospective purchasers of Standard Samples, upon request to the National Bureau of Standards.

★ ★ ★

This Circular contains an up-to-date descriptive listing of the various Standard Samples issued by the National Bureau of Standards and supersedes Circular 552 issued in August 1954. A schedule of weights and fees, as well as direction for ordering, is included. Summarized tables of analyses are presented to indicate the type of standards of composition presently available. The current status of the various standards will be indicated by a mimeographed insert.

★ ★ ★

The NBS program on standard samples has been in existence almost since the organization of the Bureau. The first standards were prepared in 1905, and today over 500 different standard samples of chemicals, ores, ceramics, and metals are prepared, certified, and distributed by NBS. They are used in industrial and research laboratories to control manufacturing processes and in evaluating the accuracy of apparatus and equipment.

★ ★ ★

The standard samples are materials that have been carefully analyzed, or whose physical properties have been precisely determined, at the Bureau and other laboratories.

★ ★ ★

Foreign remittances must be in U. S. exchange and should include an additional one-fourth of the publication price to cover mailing costs.

Riverside-Alloy Sales Office Opens in Los Angeles

A Los Angeles, Calif., sales office has been opened by **Riverside-Alloy Metal Division, H. K. Porter Co., Inc.,** to serve the rapidly expanding Pacific coast market for the products of this division.

★ ★ ★

John L. Merrill is district manager for the west coast sales territory. He was formerly associated with Eagle Metals Company, Seattle.

★ ★ ★

The office is located at 6424 East Fleet Street, Los Angeles 22.

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The many new headings, new products, address changes and other important information changes in the listings of sources of bars, rods, wire, wire products, electric wire and cable and of sources of machinery, equipment and supplies used in the Wire Industry, make this directory

INDISPENSABLE!

The Year Book Section is also completely new. It contains information to keep you posted on the affairs of THE WIRE ASSOCIATION, such as:

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WIRE AND WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

Washington Report
by Larston D. Farrar

Mr. Farrar is a noted Washington correspondent and one of the country's leading writers on what is happening in the nation's capitol. He is the author of one of the best-sellers, "Washington Low-down," considered by critics as the finest book on Washington so far written. This column, if it meets with the approval of our readers, will be a regular monthly feature.—Ed. Note.

The first session, 85th Congress, will wind up its affairs in six weeks or less, leaving very few groups happy with the results.

★ ★ ★

Congress has made few moves this year that would cause either jubilation or anguish, reflecting the caution of its (mostly-elderly) leaders, who believe that, when in doubt, do nothing.

★ ★ ★

There are the inevitable arguments over the state of the nation, economically, on Capitol Hill.

★ ★ ★

Democrats underscore unusual number of individual bankruptcies, record-making failures among small businesses, "hard money" and other troubles.

★ ★ ★

Republicans accent the positive. They point to a gross national product at a $427-billion-a-year rate; personal income at a $339-billion a-year-rate, and record-breaking corporate profits.

★ ★ ★

It's agreed that, due to Congressional action on housing and other factors at work (such as the highway construction program that is gathering momentum), business will be better in the last half than it was in the first half.

★ ★ ★

The controversial pre-merger notification bill, slated to clear the House of Representatives in June, is likely to squeak through the Senate, although this is far from certain.

★ ★ ★

Robert H. Merrill, manager of materials at the **General Electric Company's** Wire and Cable Depart-

ment, Bridgeport, Conn., has become the first GE employee to serve as director of the Copper Division, Business and Defense Services Administration, U.S. Department of Commerce. He will serve for six months without compensation under the executive rotation system used by BDSA.

★ ★ ★

A new 61-page booklet, "Second Injury Funds," covering the meaning, history and purpose of such funds under workmen's compensation, is available from the Bureau of Labor Standards, U.S. Department of Labor, Washington 25, D. C.

★ ★ ★

Small Business Administration here is making loans by the hundreds every month—some for quite-substantial amounts. The Doran Wire & Manufacturing Company, of Mundelein, Ill., a wire spooling firm with eight employees, has been granted a $10,000 SBA direct loan; Universal Wire Products, Inc., of North Haven, Conn., a wire rope manufacturer with 59 employees, has been granted a $100,000 participation loan by SBA.

★ ★ ★

Consolidation of 11 Management Aids for Small Business into a single permanent volume, now available for 45 cents a copy, has been announced by SBA. The volume, Annual No. 3, contains Aids leaflets issued from July, 1954, through June, 1955. First Annual had 31 Aids; the second Annual 21 Aids. Latest volume may be ordered from U.S. Superintendent of Documents, Government Printing Office, Washington, 25, D. C.

★ ★ ★

Net public and private debt in the U.S. rose $28 billion, or 4.5 per cent, in 1956, according to the Office of Business Economics, U.S. Department of Commerce. This compares with the record peacetime advance of $49.5 billion in '55. Total debt, public and private, as '57 began, stood at $684 billion. Debt now stands far and away at

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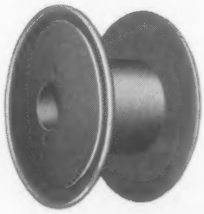

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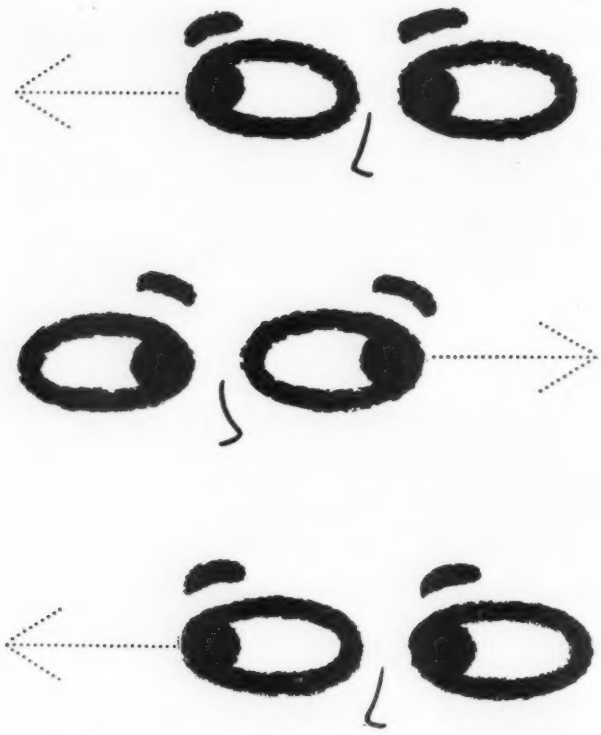

Alternating stresses bear watching!

Back and forth . . . up and down . . . in and out . . . if those stresses keep changing, the life of a metal part is a hard one . . . and often a short one. Stress reversals can cause "fatigue" failure at stresses far below the expected strength of the metal.

One of the outstanding properties of phosphor bronze is its high resistance to fatigue failure. It is widely used for electrical switch parts, relay contact springs, bellows, rotating shafts and other moving or vibrating parts.

For detailed information on phosphor bronze, write to Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.

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* * *

More than 7,500 bills have been introduced in the House of Representatives and some 2,800 in the Senate, but most of them—thank goodness!—are gathering spider-webs in committee cubbyholes.

* * *

Cost of borrowing money has about reached its peak. It's obvious that, due to Congressional pressure, Treasury and Federal Reserve Board will take a different tack before '58 is very old and the Congressional elections get close. Democrats expect to make "tight money" their No. 1 issue next year.

Abstracts

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 34 Holborn Viaduct, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

THE PRODUCTION OF BRONZE WIRES: A REVIEW OF PROBLEMS ENCOUNTERED WITH THE VARIOUS ALLOYS AND THE PROCESSES EMPLOYED

A. W. Fielding. Wire Ind 1957 Vol 24 (278) pp 175-176 (Feb)

Low tin bronzes may be drawn with facility and at high speeds with methods similar to those for copper and brass. If tin content exceeds 2% or aluminium content 7.5%, die should be polished to 8 deg total angle and be straight-sided, speeds being moderate. Sintered carbide dies used to 25 SWG, diamonds for smaller sizes; felt that carbides could be used here also. Careful annealing and heat treatment required.

NEW ACCESSORIES FOR MULLARD ULTRASONIC DRILL

Mullard Ltd, Torrington Place, London WC 1. Wire Ind 1957 Vol 24 (280) p 364 (Apr)

New accessories extending further the performance and scope of the low power Mullard ultrasonic drilling equipment for drawing die manufacture include a slurry pump and work table and a range of matching stubs of new design which increase both the speed of drilling and the capacity of the drill. The slurry pump and work table give a continuous flow of abrasive to the drill, obviating the need for hand feeding.

THIN TUNGSTEN WIRE FOR SMALL RADIO VALVES

L. Schultink, P. G. van Zanten. Philips Techn Rev 1957 Vol 18 (8) pp 222-228 (Feb 4)

Problems of drawing wire thinner than 10 microns: wire liable to break and small apertures difficult to drill in diamond dies. Wires are first drawn, then etched electrolytically. Uniformity of dia of very thin wires is tested by passing via two diamond apertures through closed chamber into which gas is fed at constant pressure; uniformity judged by constancy of flow of gas through apertures. Wires are coated with alkaline earth carbonates; best method is electrophoresis. 7 illustr, 14 ref.

SINTERED CARBIDE DRILLING MACHINE

Dykrex Corporation of America, 33-35 Bloomfield Ave., Newark 4, N.J. Ind Diamond Rev 1957 Vol 17 (196) p 59 (Mar) (NT 313)

EFFECTS OF COLD WORK AND ANNEALING TEMPERATURES ON THE GRAIN SIZE AND HARDNESS OF VARIOUS TYPES OF COPPER WIRE

C. H. Hannon. Wire & Wire Prod 1957 Vol 32 (3) pp 293-296, 336-337 (Mar)
Hardness data (Rockwell Superficial 15-T) show second drop in hardness with increase of temp well above drop occurring at recrystallization temp. Second drop occurs at temp where there is rapid increase in rate of grain growth. 3 illustr, 4 tables.

METHOD OF GRAPHIC REPRESENTATION OF THE DRAWING PROCESS ON MULTIPLE DRAWING MACHINES WITH NON-SLIP INTERRUPTED DRAWING. METHODE ZUR ZEICHNERISCHEN DARSTELLUNG DES ZIEHVORGANGES AN GLEITLOS MIT ANSAMMLUNG ARBEITENDEN MEHRFACHZIEHMASCHINEN

F. Kowalski. Draht 1957 Vol 8 (3) pp 77-80 (Mar) (In German)

NEW SPANISH DIE CONCERN

Anon. Wire Ind 1957 Vol 24 (280) p 379 (Apr)
Announcement of joint German-Spanish venture in establishment of company for producing diamond and tungsten carbide dies at Cartagena.

Directory of Consulting Services

The 16th edition of Consulting Services has been published by the **Association of Consulting Chemists and Chemical Engineers, Inc.,** 50 East 41st St., New York 17, N. Y., in which members are classified according to activities and qualifications.

* * *

The directory is indexed alphabetically and by geographical location. The Association's Code of Ethics and By-Laws are included.

* * *

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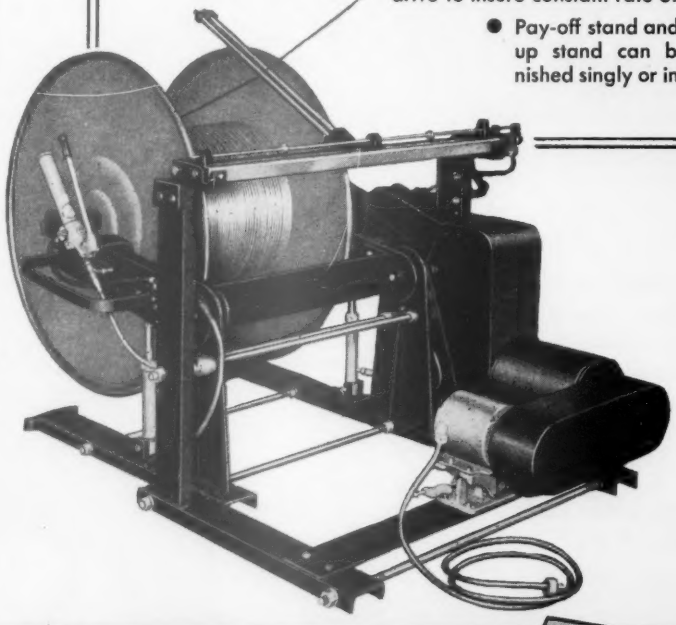

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Outstanding Personalities of the Wire Industry

Cy Johns Honored

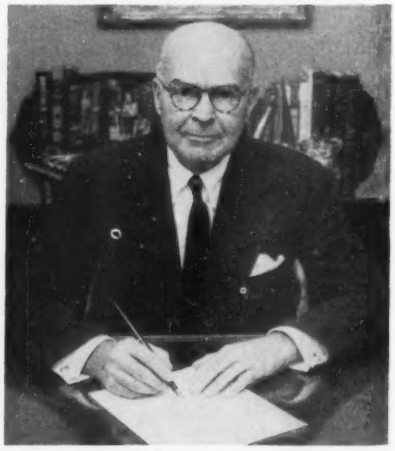
Tuesday, June 4, was designated by the Monessen, Pa., Chamber of Commerce as **Cy Johns Day** to pay tribute to a respected and dedicated man who had risen in the ranks of his firm to become president and chief executive officer of the **American Chain & Cable Company, Inc.**

★ ★ ★

Mr. Johns is known as Cy to most of the people in Monessen. Born in Sedalia, Mo., in 1894 and a graduate of the University of Missouri, class 1916, he began his long career with the **Page Steel & Wire Company** that same year. Page is now a Division of ACCO. For a period of 13 years, he worked in the Operating Department, later as Sales Engineer, Production Manager and Assistant Plant Manager. From 1930 to 1933 he was Works Manager and was promoted in 1933 to General Manager, a position he held until 1939.

★ ★ ★

A major advancement came to Mr. Johns in 1940 when he was appointed to the position of Vice President, Charge of Operations of all ACCO plants with headquarters in New York. He held this post until 1946 when he was elected Executive Vice President. On May 1, 1951, he was elected President, the position he now holds.



Cyrus N. Johns

★ ★ ★

At present, he is a Director of the **American Chain & Cable Company, Inc.; Dominion Chain Company, Ltd.; Maryland Bolt & Nut Company; Parsons Chain Company, Ltd. (England);** and **The Bristol Company.** He is a member of several societies, including The Wire Association.

★ ★ ★

Plans started the day-long ceremonies at the Page Plant with a ribbon cutting ceremony and words of welcome by Mr. Johns and **Harvey Seymour,** General Manager. An Open House, open to the general public, employees and their families was then staged to show the working facilities of the

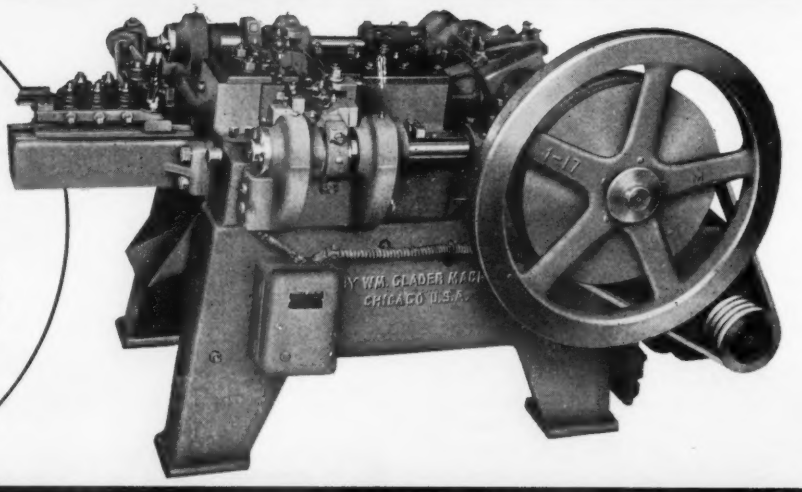
GLADER

HIGH SPEED WIRE NAIL MACHINES

HIGH TONNAGE OUTPUT—LOW MAINTENANCE COST

You can take care of increased production schedules and better product demands with these machines of established reputation.

For 55 years GLADER MACHINES have been giving HIGH QUALITY, LOW COST nail production.



Wm. Glader Machine Works 210 N. Racine Avenue Chicago 7, Illinois

Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

Plant and give the public an idea of the scope and variety of products manufactured at Monessen and other ACCO Plants throughout the country. In the evening, Mr. Johns was the guest of honor at a dinner given by the Monessen Chamber of Commerce at which he talked about his experiences at ACCO and recalled some of his days living and working in Monessen.

To Direct Development of Elgin's Industrial Divisions

Appointment of **Dale V. Cropsey** as assistant to the president of **Elgin National Watch Company,** specializing in development of that firm's industrial division, has been announced by **J. G. Shennan,** president.

★ ★ ★

Mr. Cropsey joined Elgin in July, coming from Potter & Brumfield, Inc., Princeton, Ind., where he has been vice-president and director of sales for the past two years. Previously he had been works manager.

★ ★ ★

He will assume supervision of Elgin's electronics and abrasives divisions. The former specializes in relays and communications equipment and the latter makes diamond abrasive compounds, rotary carbide tools and commercial applications for Elgiloy, a special-purpose alloy originally developed for watch mainsprings.

Michigan Oven Announces Appointments

Two new appointments were recently announced by **A. C. Towne, Jr.,** President of **Michigan Oven Co.,** Detroit. They were **Ernest R. Meyers,** Assistant Sales Manager and **Graham Barton,** Engineering Sales Representative, Michigan territory.

★ ★ ★

Mr. Meyers has previously been associated with Newcomb-Detroit Company for ten years in sales work involving engineering, estimating and proposal preparation. Prior to this, he was associated with Rapid Standard Company and Mechanical Handling Systems. He is an alumnus of Michigan State University.

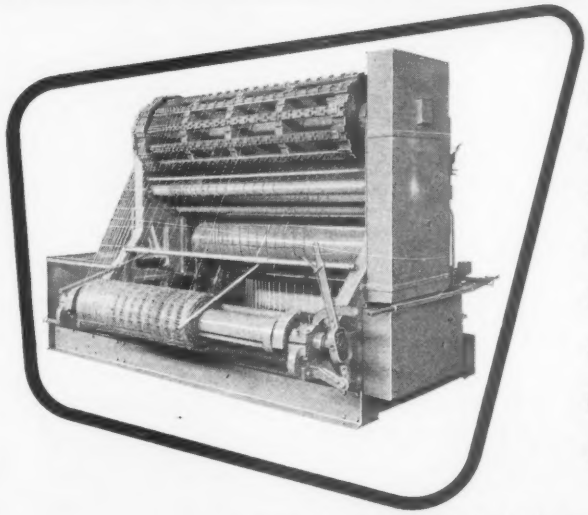
★ ★ ★

Mr. Barton's experience is primarily with Michigan Oven as Senior Draftsman, Erection Superintendent, Service Engineer and Draftsman. In 1955, he was appointed Supervisor of Engineering for Walsh Metal Products, Inc., a subsidiary of Michigan Oven. Barton is a graduate of Detroit Institute of Technology.

SIC Appoints Research Director

Standard Industrial Compounds Company, Frankfort, Ill., has announced the association of **Erich Muethlein,** who will direct the research and development of **Standard's** products. Mr. Muethlein obtained his training and chemical degree from the University of Heidelberg in Southern Germany. Following his education,

Interlocking FENCE LOOMS



- Fastest — Most Efficient
- Preferred by Leading Mills
- Low Maintenance Cost
- Wrapped Stay Fence
- Straight Stay Wires
- Integrated — Space Saving
- Replaceable Main Bearings
- Single or Double Strands
- Years of Low Cost Production

Write for Detailed Information — Without Obligation

Interlocking Fence Co., Box 8, Morton, Ill.

Specialists In Fence Looms

he had wide and varied experience in the manufacturing of inks, glues, adhesives and other chemicals. He served in the development and management capacities during a three year association with a prominent and reputable German lubricating firm. Mr. Muethlein has been the author of technical bulletins and articles appearing in foreign trade journals.

Elgin Names Engineer For New England

The Abrasives Division of **Elgin National Watch Company** announces the appointment of **Bernard T. Martin,** as sales engineer in the upper New England area.

* * *

William H. Baudouine, Division Sales Manager, said the territory has been divided to provide improved service for customers. Mr. Martin, whose address is 10 Pine Street, East Longmeadow, Mass., will handle sales in that state, as well as Vermont, New Hampshire, and Maine. **Roy Zahn,** Hartford, Conn., will continue to handle sales activities in the southern New England region.

* * *

The Division markets a wide line of industrial diamond abrasives, carbide rotary tools and Elgiloy, spring material.

La Salle Steel Appointments

La Salle Steel Company, of Hammond, Ind. announced three promotions in its operating department effective May 3rd. **Howard McMinds,** formerly responsible for plant scheduling, has been appointed to the position of Manager of Industrial Relations and will be responsible for Industrial Engineering and Personnel.

* * *

General Foreman appointments were given to **Frank Kyle** and **Kenneth Guse.** Kyle will be responsible for direct supervision of the production line departments and process engineering while Guse will direct the servicing departments such as raw material and pickling.

Columbia-Geneva Appointments

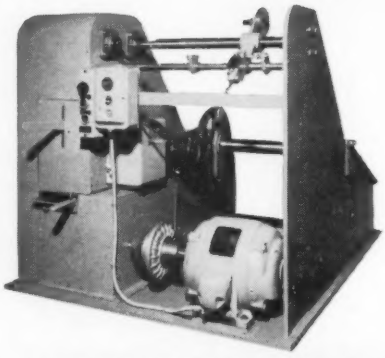
Donald E. Rice has been appointed general manager - operations of **Columbia-Geneva Division of United States Steel** with headquarters in San Francisco, and **Charles C. Morgan** was named to succeed him as general superintendent of the division's Pittsburg Works, **J. D. McCall,** vice president - operations announced in March.

C F & I Appoints Jennings in New York

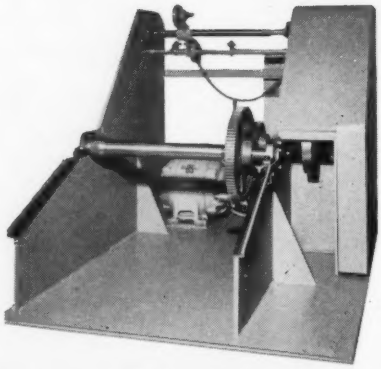
George C. Jennings has been appointed New York district sales manager of the **Wickwire Spencer Steel Division of the Colorado Fuel & Iron Corp.,** it was announced by **L. A. Watts,** general manager of sales, Eastern Division. Mr. Jennings succeeds **C. K. Pattison,** who will handle special assignments for the corporation.

HIGH-SPEED RESPOOLER

MODEL 30-R-56



Capacity:
500 lbs. to 1000 lbs. weight
Reels:
up to 30 inch diameter
Traverse:
adjustable to 17 inch Max.
Normal lay .140 inch
Magnetic auto-reversing
Drive Motor:
ample size—2 H.P.
Fluid Drive:
"Twin Disc" clutch
Brake:
magnetic or manual
Loading-Unloading:
choice of hydraulic or manual



FEATURING: Velvet smooth starts — Positive stops — Quick reverse — Sturdy construction — Anti-friction bearings throughout

WIDE RANGE OF TYPE AND SIZE RESPOOLERS AVAILABLE

Any Wire Machinery Problems? Write and Tell us —

BARTELL

BARTELL MACHINE-TOOL CORP.
ROME, NEW YORK

Sales Executive Becomes Crucible Officer

The election of **Geo. W. Stamm** as Vice President and General Manager of Sales of Crucible Steel Company of America has been announced by **Joel Hunter,** President.

★ ★ ★

Mr. Stamm formerly was General Manager of Sales. He succeeds **James D. Glenn,** who wished to be relieved of his responsibility as Vice President-Sales because of illness and who will continue with Crucible in a consulting capacity. Mr. Stamm joined the company in 1940 in the St. Louis Sales Branch. After holding various sales posts, in January of this year he was appointed General Manager of Sales.

Phillips Electrical Co. Elects Lauder Director

At the recent annual meeting of the **Phillips Electrical Company Limited** in Brockville, **Mr. Archie Lauder,** Vice President Consultant was elected a director of the company. Mr. Lauder has been with the company for 44 years and is widely known in the wire and cable industry. He brings a sound practical knowledge of the business to his new position.

Archie Lauder

Appointment by P. C. Borax

Pacific Coast Borax Company, Division of **United States Borax & Chemical Corp.** has announced the appointment of **Jay B. Ford, Jr.** as Assistant General Manager. Mr. Ford, a graduate of Stanford University and the Harvard School of Business Administration, was formerly with the United States Potash Company Division, where he had been Assistant Treasurer and subsequently Assistant General Manager.

★ ★ ★

J. F. Corkill, Vice President and General Manager of the division, states that Mr. Ford will make his headquarters in New York and will be generally responsible for administrative and executive functions within the division.

SEE THE DIFFERENCE YOURSELF...
BETWEEN JUST ANY SPOOL AND
Superior MPS
NO-CREV SPOOLS
No-Crev Spools eliminate the conventional crevice at the inner junction of spool head and barrel. No more production slow-ups due to fine wires getting caught in such a crevice. You can now have continuous trouble-free high speed winding.
We invite your inquiries — let us tell you more about No-Crev Spools. Write us today.
MPS
NO-CREV SPOOLS
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
Mossberg PRESSED STEEL Corporation
18 WEST ST., ATTLEBORO MASSACHUSETTS, U. S. A.
Telephone Attleboro 1-0848
#108

Clayton Fisher Moves Office

Clayton F. Fisher, who resigned recently as President and General Manager of **Sleeper and Hartley, Inc.** to become a consultant, has announced the opening of offices at 73 Cherry St., Spencer, Mass.

★ ★ ★

Mr. Fisher's experience covers a period of 40 years and he will be available for consulting services on wire mill, spring forming, cable armouring, flexible tube, management, production, plant layouts, modernization, special machine design, tooling and other engineering problems.

Appointments at Pittsburgh Steel

Herbert A. Long has been promoted to general manager-operations, **Pittsburgh Steel Co.,** Pittsburgh. He succeeds **Carl A. Breuer,** who was elected vice president-operations Apr. 10. **John C. Peth Sr.** succeeds Mr. Long as chief engineer and **Elmer E. Barthel** has been appointed chief electrical engineer.

Made Superintendent at Wright Steel & Wire

George H. Fryburg has been named superintendent of **G. F. Wright Steel & Wire Company,** Worcester, Mass. He had been assistant superintendent since 1951 when he joined the company. He was in the Navy during World War II and graduated in 1947, from Upsala College.

Auto-Lite Appointments

Electric Auto-Lite Company has announced a series of appointments made by Auto-Lite vice president and director of engineering **L. H. Middleton** within the company's Wire and Cable Engineering division.

★ ★ ★

Francis J. Oberhausen, formerly chief engineer of the **Acme Wire Corporation** and a veteran of 27 years in all phases of wire and cable production, research and development, comes to the Port Huron, Mich., headquarters of the Auto-Lite Wire & Cable division as administrative assistant to **F. H. Wetzel,** chief engineer of the division.

★ ★ ★

Robert A. Barker and **N. B. Cawthorne** have been named section engineers in charge of specialized research and development areas and **H. W. Borgman,** a project engineer, all at Port Huron. At the Hazleton plant, **Leo O. Ravina** has been appointed resident engineer.

Chain Company Announces Appointments

Standard Steel & Wire Corp. of N. Y. through its Chairman, **Matthew J. Hall,** has announced the appointment of **John J. Noon,** formerly of the **McKay Company,** Pittsburgh, as its General Manager.

★ ★ ★

The company has leased warehouse facilities in Brooklyn, New York, where a complete line of all chain products will be stored.

★ ★ ★

Sjogren
WELDING ROD COILER
Another specially designed machine for a specific purpose!
This Sjogren designed and built Welding Rod Coiling machine has many advantages for the user. It will pre-cast welding rod wire to any required spool curvature from 12" I.D. to 25" I.D. after straightening the wire from the coil and passing it through a mechanical counter that measures pre-determined footages. The pinch rolls are driven from a GE Speed Variator with motorized rheostat for slow acceleration to pre-determined speeds ranging from 57 to 900 feet per minute.
The spool is driven by a variable torque motor. Traverse mechanism is easily adjustable for various wire diameters and is kept in perfect syncronization to spool speed by use of a tachometer generator feeding back through the electronic equipment.
For 1/16" to 3/8" wire diameters
USED BY WIRE MEN WHO WANT THE BEST!
Sjogren
SINCE S&S 1927
TOOL & MACHINE CO., INC.
WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS
14 Sword St.
AUBURN, MASS.

The company also announces the appointment of **Harold M. Murray** as Eastern Sales Manager. He was formerly McKay's District Sales Manager.

★ ★ ★

Mr. Hall was one of the organizer and later the President of **Continental Copper & Steel Industries, Inc.**, and also was one of the founders of **Spencer Wire Corp.**, Union, N. J.

ASTM Honors Faragher

Dr. P. V. Faragher, of the **Aluminum Company of America,** long time Chairman of Subcommittee VII on Conductors of Light Metals, has been voted the 1957 Award of Merit by the Board of Directors of the **American Society for Testing Materials.**

★ ★ ★

This Award was presented during the Annual Meeting at Atlantic City on June 19, 1957.

To Represent ACP in Far West

Charles R. Wirshing has been named Metalworking Chemical Sales Manager, West Coast District. according to an announcement by **Gerald C. Romig,** President of the **American Chemical Paint Co.,** Ambler, Pa. Mr. Wirshing became a member of the ACP sales staff, in Detroit, ten years ago and was transferred to Niles. California, in 1952. He resides at Los Altos, Calif.

District Manager of Firth Sterling (Canada)

Harry Davidson, Asst. District Manager of the Ohio Sales District for Firth Sterling Inc., has been appointed Canadian District Manager for **Firth Sterling (Canada) Ltd.** Brantford, Ont., Can. A local sales force will be organized during the summer. The Canadian sales territory includes all of Canada, with sales efforts being concentrated in Ontario and Quebec.

★ ★ ★

Mr. Davidson has been with Firth Sterling Inc. for twelve years, and was the first member of the company's Million Dollar Club. Since he became associated with Firth Sterling, he has specialized in mining applications.

Elgin Names Sales Engineer, New York Territory

The Abrasive Division of **Elgin National Watch Company** announces the appointment of **William E. Burgoyne, Jr.,** as Sales Engineer in its New York City area. His appointment was announced by W. H. Baudouine, Division Sales Manager.

★ ★ ★

He will handle sales of the company's broad line of industrial diamond compounds, carbide and mills, rotary tools and burs, as well as Elgiloy, high corrosive-resistant spring alloy, from 160 Valley Rd., Montclair, N. J.

NORBIDE Abrasive Grain... *cuts die Refinishing Costs!*

If you are still using costly diamond dust for refinishing your wire drawing dies, you'll be amazed at the savings you can make by switching to NORBIDE Abrasive. Wire mills everywhere have found that this abrasive—the hardest manufactured abrasive commercially available—is ideal for ripping and semi-finishing operations.

NORTON®
BORON CARBIDE
Making better products... to make your products better
NORTON COMPANY
45 New Bond Street, Worcester 6, Mass.

Many of our customers order NORBIDE Grain in 100 lb. drums. Many others order and re-order ¼ lb. and ½ lb. cans. No matter what your requirements are we can fill your order promptly from stock.

For details and prices on this cost-cutting abrasive write for Form 559.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes.

NORBIDE® | *The hardest manufactured abrasive commercially available!*

Elmer E. Barthel, who joined the company in 1956, succeeds Mr. Peth as chief electrical engineer.

Anaconda Elects New Officers

At a recent meeting of the Board of Directors **William E. Sprackling** was elected President and Chief Executive Officer of **Anaconda Wire and Cable Company,** New York City.

★ ★ ★

Other elections to official posts were announced as follows: **Richard B. Steinmetz,** Executive Vice President; **Vito di Lustro,** Vice **President** in Charge of Manufacturing; and **David E. Allen,** Vice President, Sales.

Macwhyte Appoints Rope Engineer

Ferd Chiappetta has been appointed wire rope engineer by **Macwhyte Co.,** Kenosha, Wis., to succeed **William C. Russell,** who retired earlier this year.

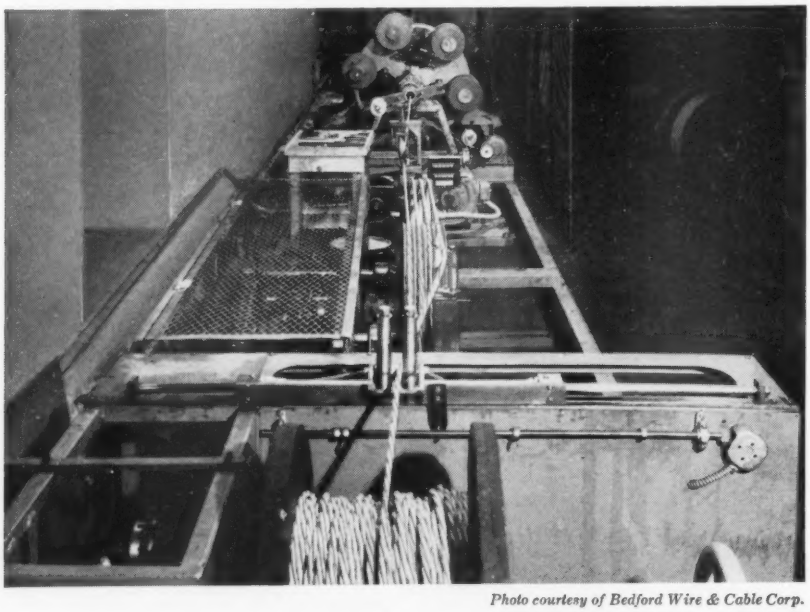


Photo courtesy of Bedford Wire & Cable Corp.

For Cleaner, More Economical Operation, Use

PLYMKRAFT

CABLE FILLER

Just name the type put up and the type treatment—such as wax, jute saturant, anthracene—to conform with your equipment requirements and see the difference Plymkraft can make in your operation. Cleaner to use, always uniform and made to a fine tolerance, these fillers are ideal for high speed cablers where extra strength is a must. If you would like to know how you can have a cleaner, more economical cable operation ask your Plymouth Plymkraft salesman—Or if you have a cable filler problem our engineers are available for consultation—just write.

PLYMKRAFT DIVISION

PLYMOUTH CORDAGE COMPANY

PLYMOUTH, MASSACHUSETTS

To Manage Firth Sterling's Canadian Plant

Thomas F. Nakles, Assistant Superintendent, Carbide Division, **Firth Sterling Inc.,** has been appointed General Manager of **Firth Sterling (Canada) Ltd.** at Brantford, Ontario.

★ ★ ★

Mr. Nakles is now in Canada, supervising the construction of the new plant and the manufacturing facilities. Initial production of carbide is scheduled for the middle of July, with full production estimated for the middle of October.

★ ★ ★

In April, Firth Sterling announced the formation of Firth Sterling (Canada) Ltd., financed jointly by Firth Sterling Inc. and Canadian interests.

Technical Catalogue on Wire Drawing Lubricants

Standard Industrial Compounds Company, Inc., manufacturers of wire drawing lubricants, has recently made available to its customers a technical catalogue. This booklet contains information on 65 of the most prominent wire drawing lubricants in the industry. Each one of the products is explained as to its general usage, the wire finish obtained, as well as the type of soap characteristics and general description. These individual data sheets may be deleted or added to this new type of binder. Periodic additions will be supplied when new products have been proven and accepted.

★ ★ ★

The entire catalogue is available, or individual sheets for specific purposes may be obtained by writing to Standard Industrial Compounds Co., Inc., Frankfort, Illinois.

New Folder on Glass-Teflon Yarns, Tapes and Cloth

Dodge Fibers Corp., Hoosick Falls, N. Y. has published a technical bulletin on glass-teflon yarns,

tapes and insulating cloth for electrical applications containing an abundance of useful information on the properties and specifications of these materials.

★ ★ ★

These materials, called "Fluorglas", have unusual properties for high temperature applications and are dielectrically strong, chemically inert, tough, flexible, nonabrasive, fungus proof, as well as combining the other desirable features of these two excellent substances.

★ ★ ★

A copy of the bulletin will be mailed by the company to interested readers upon request.

Building New Fastener Plant

Pittsburgh Screw and Bolt Corp. has begun construction of their new plant located between Mount Pleasant and Scottdale, Westmoreland County, Pa. The new plant will manufacture and stock a complete line of bolts, nuts, screws, rivets and various types of other industrial fasteners.

★ ★ ★

Located on 75 acres, the plant will have approximately 600,000 square feet, of which 300,000 square feet will be used for manufacturing and 300,000 square feet for packing, shipping, and warehousing. An eight acre parking lot will accommodate 750 cars. The entire plant will be of modern, one-story construction and will incorporate the most advanced methods, machinery and equipment for the production of industrial fasteners and allied special products. The two-story office building and complete cafeteria facilities will require 43,000 square feet. All facilities have been planned for possible future expansion. The plant is scheduled to be in operation early in 1958.

Crucible Steel Publishes New Catalog

Crucible Steel Company of America announces the availability of a new 232 page Product and Warehouse Catalog.

Designed for purchasing agents and steel users, the catalogue describes over 700 products available from stock at Crucible warehouses located throughout the country.

★ ★ ★

The book index lists 16 categories of special purpose steels, including High Speed, Tool, Stainless, Alloy and Machinery, available in 16,000 grades and sizes. Over 20 estimating, conversions and weight tables as well as other information useful to steel users are also included.

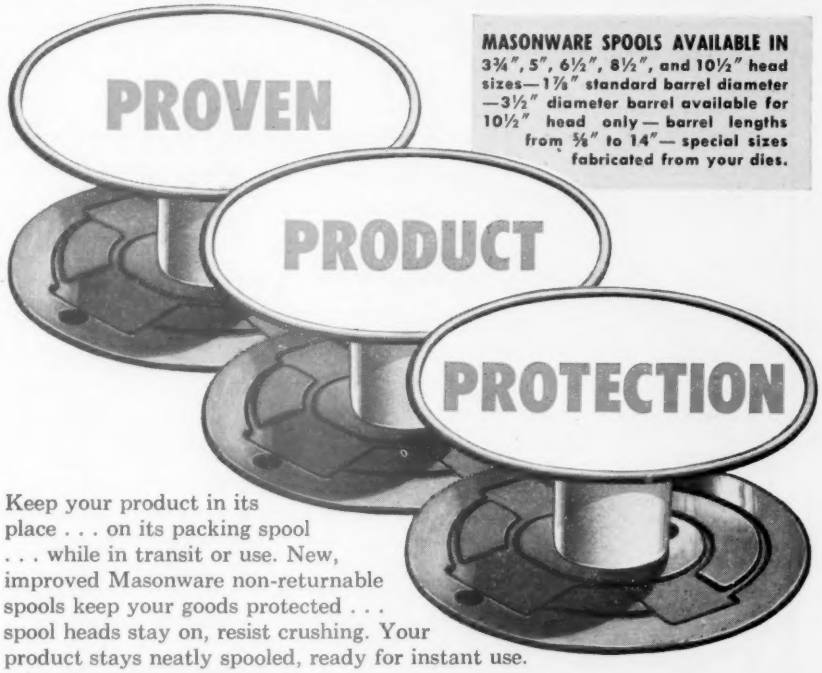
★ ★ ★

A copy of the catalogue may be obtained by sending a request on company letterhead to Engineering Service Department, Crucible Steel Company of America, Box 1558, Pittsburgh 30, Pa.

Teflon Magnet Wire Kit

A wide variety of gauge sizes in Class HT Teflon coated Magnet Wire is now being offered in a

New, Stronger Masonware Spools Give You



MASONWARE SPOOLS AVAILABLE IN 3¾", 5", 6½", 8½", and 10½" head sizes—1⅞" standard barrel diameter —3½" diameter barrel available for 10½" head only — barrel lengths from ⅝" to 14"— special sizes fabricated from your dies.

Keep your product in its place . . . on its packing spool . . . while in transit or use. New, improved Masonware non-returnable spools keep your goods protected . . . spool heads stay on, resist crushing. Your product stays neatly spooled, ready for instant use.

One of the oldest spool manufacturers in the country, Masonware services well over 200 companies. These companies depend on lightweight Masonware spools for effective packaging of:

INSULATED WIRE — SOLDER WIRE
THERMO-COUPLE WIRE — WEATHER STRIPPING
TV LEAD-IN WIRE — PLASTIC TUBING
AUTOMOTIVE CABLE

Tell us about your spool requirements NOW! We'll prove Masonware Spools keep costs down—sales up! Let us solve your spool problem! Write, wire or call:

MASONWARE COMPANY

1949 Dexter Road, East Providence, R. I. • Phone GEneva 4-2810
Branch Plant—Greenville, Ohio

single kit, by the **Tensolite Specialties Inc.,** Tarrytown, N. Y. This kit was designed specifically for use in research and development projects where small quantities of different gauge sizes are needed for prototypes and experimentation.

★ ★ ★

The kit contains an assortment of 12 miniature spools of Teflon coated magnet wire in gauge sizes 20 through 42 AWG. This wire conforms to Type III, MIL-W-19583 (NAVY) specifications.

★ ★ ★

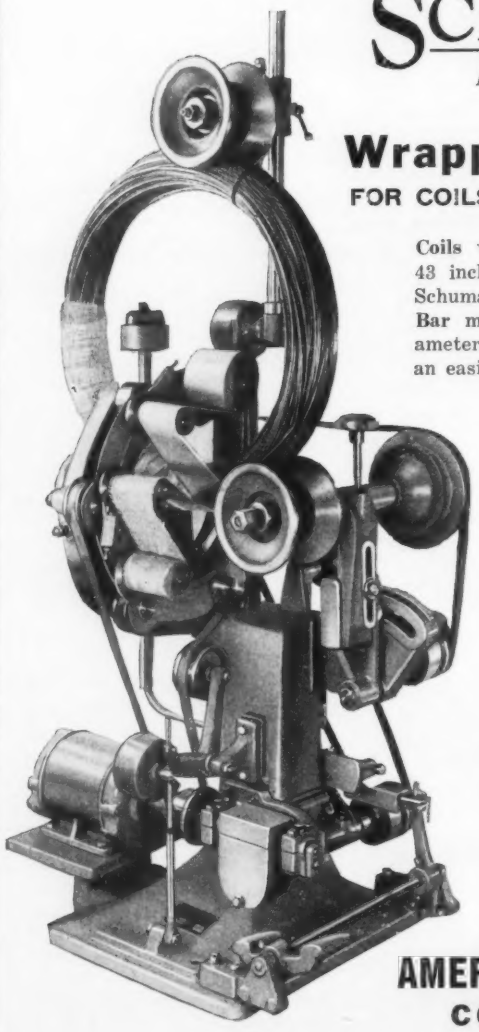
The creation of this multi-purpose kit will afford greater economy, versatility and efficiency in the selection of magnet wire to fit the particular development needs. The consequent ease of identification will result in greater accuracy in ordering production quantities.

★ ★ ★

For further information, write Tensolite Specialties, Inc., 198 Main St., Tarrytown, N. Y.

SCHUMAG
AACHEN

Wrapping Machine
FOR COILS, BARS AND BUNDLES



Coils with outside diameters up to 43 inches are handled by the basic Schumag WS 2a machine illustrated. Bar material up to 6 inches in diameter is handled by the addition of an easily attached auxiliary device.

Outstanding Features

- Coils, bars and bundles automatically wrapped tightly and smoothly.
- Solidly guided open wrapping ring.
- Precision adjustment of wrapping-band tension. Once set, tension remains constant.
- Adjustable wrapping pitch. Special ranges available on order.
- Automatic shut-off of wrapping mechanism, adjustable for any size of coil.

Write for descriptive literature, or send us your wrapping specifications

Exclusive Representatives for the U.S.A., Canada and Mexico

AMERICAN LAUBSCHER CORPORATION
Fisk Bldg., 250 West 57th Street
New York 19, N. Y.

J & L Opens New Bar Mill

The new Cold Finished Bar Mill of **Jones & Laughlin Steel Corp.** started production in Willimantic early in June.

★ ★ ★

H. H. Meyer, has been appointed manager of the Willimantic Division which will employ approximately 60 to 70 persons initially. It is located on a 31-acre site adjacent to the land occupied by the American Screw Company plant on Connecticut Route 32, West Main Street.

★ ★ ★

An informal open house and plant tour was held at the new mill on Wednesday, June 12, for J&L's New England customers. Executives from the Pittsburgh headquarters of Jones & Laughlin, the nation's fourth largest steel producer, were present at the open house, headed by **John E. Timberlake,** Vice President of Sales for J&L.

★ ★ ★

D. T. Rogers, Manager of J&L's Cold Finished Bar Division, said "These new facilities were especially designed to insure excellent service to New England users of quality cold finished steels. While J&L has been active in Eastern markets for a number of years, our shipments formerly had to be made from our Pittsburgh mills."

Folder on Diameter Controls

A folder which describes the latest systems for continuous, noncontact, diameter controls for processing insulated wire, extruded tubing, rods, shapes, filaments and special wires has been published by **Industrial Gauges Corporation,** makers of Microlimit Controls.

★ ★ ★

Systems work on all shapes in the range of .001" to .750". Automatic Control limits are adjustable from 1/20 full scale to full scale.

★ ★ ★

Write them at 1500 The Plaza, West Englewood, N. J., for a copy.

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,791,243, WIRE STRAIGHTENERS, patented May 7, 1957 by Christian Paulson, Elmhurst, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The machine includes a cartridge having a pair of rods each having an elongated slot extending longitudinally from end to end and laterally from the periphery thereof past the longitudinal axis thereof, a number of cam plates insertable into the slots, and a device locking the rods together against thrust.

★ ★ ★

No. 2,791,783, SPRING CUSHION ASSEMBLY, patented May 14, 1957 by Murray J. Rymland, Baltimore, Md.

It is stated that the assembly is adapted for semi-automatic and automatic assemblies and prevents padding or filling material from entering into the component helical springs thereof.

★ ★ ★

No. 2,792,852, WIRE BENDING APPARATUS, patented May 21, 1957 by Lloyd Talbot and Byard D. Simpson, Chicago, Ill., assignors to Cedar Rapids Block Co., a corporation of Iowa.

The apparatus includes two arms, one pivoted to the other to form a bending knee, which arms retain a length of wire for bending into a V.

★ ★ ★

No. 2,792,869, WIRE COILING MACHINE HAVING AN ACCURATE WIRE FEEDING MECHANISM, patented May 21, 1957 by Elmer W. Halvorsen, Auburn, Mass., assignor to Sleeper & Hartley, Inc., Worcester, Mass., a corporation of Massachusetts.

A wire coiling machine is disclosed comprising an intermittently rotatable and reciprocable wire coiling arbor arranged to draw a wire forward and coil the same. This includes a rack bar, a gear train, a rack bar cam and a cam flower to feed a definite length of wire.

★ ★ ★

No. 2,792,870, SPRING WINDING APPARATUS HAVING A CARRIAGE ADVANCING RACK WITH BLANK TOOTH PORTION, patented May 21, 1957 by Harold C. R. Carlson, Brooklyn, N. Y.

Carriage assembly is moved a predetermined distance simultaneously with the rotation of an arbor, the rack being provided with a blank portion thereon whereby a cam is rendered inoperative during disengagement of the rack and pinion under continued rotation of the arbor.

★ ★ ★

No. 2,793,144, METHOD AND MEANS FOR TREATING WIRE, patented May 21, 1957 by James E. Crowley, Bethlehem, Pa., assignor to Bethlehem Steel Company, a corporation of Pennsylvania.

In this patent a method of removing deleterious material from a round filament is disclosed, which comprises passing the filament longitudinally along and around the surface of a round rod of spiral formation and in single line contact therewith, the internal diameter of the rod spiral being less than the diameter of the filament during the passage of the filament along and around the spiral.

★ ★ ★

No. 2,793,818, APPARATUS FOR WINDING COILS, patented May 28, 1957 by William W. Clarke, Brookfield, and Henry S. Walendzik, Danbury, Conn., assignors to Boesch Manufacturing Company, Danbury, Conn., a corporation of Connecticut.

This is a machine for winding wire helically upon an annular core by means of a rotating grooved winding ring associated with a stationary guide and engaged by the strand.

★ ★ ★

No. 2,793,821 WIRE REEL DIS-

What's your problem?
MAYBE WE CAN HELP!
We can design and make a lot of things besides spools. We have the imagination, the research facilities and the engineering experience to take tough problems off your hands. Why not tap that experience for your own use?
WHAT KIND OF A SPECIALTY DO YOU NEED?
• Special equipment?
• Specially designed machinery?
• A fabricated piece you can't get anywhere else?
• Experimental and development work?
Write or call us today
Acrometal makes a complete line of precision aluminum (and steel) spools for processing and shipping fine wire. Also disposable reels and packages up to 1,000 lbs. capacity.
ACROMETAL PRODUCTS, INC.
616 Fifth Street N., Minneapolis 1, Minn.

PENSERS, patented May 28, 1957 by Abraham Madow, West Newton, Mass., and Hyman S. Glasband, West Hartford, Conn.

A roll-type wire dispenser is disclosed including fibre-board disc-like end plates connected by a cylindrical core. Cuts in the end plates extend to the connection with the core.

Buys Kellogg's Chemical Manufacturing Div.

Purchase of the KEL-F chemical manufacturing business from **The M. W. Kellogg Company**, a subsidiary of **Pullman Inc.**, by **Minnesota Mining & Manufacturing Co.** has been announced jointly by officials of the two firms.

★ ★ ★

Officials of Minnesota stated that the firm will take over the KEL-F manufacturing facilities adjacent to Kellogg's Jersey City plant and laboratories.

★ ★ ★

A spokesman for Kellogg said that the sale would have no effect on the M. W. Kellogg petroleum and petro-chemical research laboratories and the other Kellogg manufacturing activities in Jersey City.

★ ★ ★

The 3M spokesmen said their primary interest in purchasing the KEL-F business is to develop additional uses for these high temperature, corrosion resistant resins.

★ ★ ★

The M. W. Kellogg Company originally became associated with the KEL-F polymer field as a result of their engineering assignment at Oak Ridge, Tennessee during World War II.

IDA Hold Annual Meeting

The Industrial Diamond Association of America, Inc., Pompton Plains, N. J., held its 12th Annual Meeting and Convention on May 20-22 at the St. Clair Inn, St. Clair, Mich., electing the following Officers to serve for the coming year: President, **Willard L. Huber,** Diamond Tool Research Co., Inc., New York; First Vice President, **Morris Winston,** Diamond Drill Carbon Co., New York; and Second Vice President, **Donald J. Wallace,** Wheel Trueing Tool Co., Detroit. Directors elected for the following two years were: **Milton Berk,** Mid-West Diamond Service, Chicago; **Herman J. Meinert,** J. K. Smit & Sons, Inc., Murray Hill, N. J.; **Leopold H. Metzger,** Super-Cut, Inc., Chicago; and **Charles Slesinger,** Charles Slesinger, Inc., New York. The outgoing President, **Jan Taeyaerts** will serve as Director for the coming year. The Board of Directors elected **Margaret J. McGinnis,** Executive Manager-Secretary, and **Athos D. Leveridge,** Treasurer.

★ ★ ★

The Convention was arranged by Mr. Leveridge and Mrs. McGinnis and a special Detroit Convention Committee under the chairmanship of Donald J. Wallace. Some of the many topics discussed during the General Sessions were those on the standardization of diamond wheels, tools and powder and compounds; revision in the By-Laws, IDA's participation in the 1958 ASTE Industrial Exhibit in Philadelphia, Membership matters and IDA's 1958 Convention. The site voted on for next year was Bermuda.

★ ★ ★

A reception given by the Detroit Member of I.D.A. took place im-

WRITING TECHNICAL ARTICLES

AN INVITATION

You derive much benefit from the articles that appear in WIRE AND WIRE PRODUCTS and in turn might well share your knowledge with others in the Wire Industry. That helps to keep the industry progressive and prosperous. We are glad to pay for wire or wire product papers, but many authors prefer to contribute articles for the good of the industry. All such articles or papers contributed by members of THE WIRE ASSOCIATION are eligible for the Medal Award or Certificates of Honorable Mention.

Won't YOU help out by writing for WIRE AND WIRE PRODUCTS in 1957?

Write to the

EDITOR

WIRE AND WIRE PRODUCTS

453 MAIN STREET • STAMFORD, CONNECTICUT

mediately before the Annual Banquet on Wed. May 22. During the banquet a beautifully hand-painted scroll, signed by all Members and Associates, was presented to **Athos D. Leveridge** in appreciation and affection for his many years of devotion to the Association. He was also the recipient of a purse presented on behalf of the Members by I.D.A.'s First President, **Harvey B. Wallace,** one of the founders, also a Past President, **Stephen Hofman,** U.S. Industrial Diamond Corp., New York.

★ ★ ★

Guests of honor at the banquet were **Joseph J. Coen,** Metalworking Equipment Div., B.D.S.A., Dept. of Commerce, Washington, D. C.; **Clyde Fanning,** General Motors Inst. and **Allen P. Wherry,** Manager, Grinding Wheel Inst.

★ ★ ★

The following new members were welcomed in absentia: **A. G. Heinze,** A. G. Heinze Co., Pasadena, Calif.; **Paul Fessel,** Rock-Saw Corp., Long Island City, N. Y.; **Leonard A. Zucker,** Union Wire Die Corp., New York; **Sal Dolinger,** Sal Dolinger, Inc., New York, and **Donald A. Trescott,** Super-Cut, Inc., Chicago.

★ ★ ★

New members welcomed in person were: **Andrew Labowsky,** Diamond Production, Inc., Clifton, N. J., **Brian Todd,** Triefus & Stripp Ltd., Toronto, Canada, **Abraham Berliner,** Diamond Tool Research Co., Inc., New York, and **Harold C. Miller,** Super-Cut, Inc., Chicago.

To Produce More Teflon

The DuPont Company has announced plans for a major expansion of its facilities at the Washington Works, Parkersburg, W. Va., for producing "Teflon" fluorocarbon resins — the third since 1950 when its first commercial unit began operation. Production of all four commercial tetrafluoroethylene resins, the granular powders, "Teflon" 1 and 5; the fine powder, "Teflon" 6, and the aqueous dispersion, "Teflon" 30, will be increased. Output of "Teflon" 1 and 5, used for compression-molding and ram or screw extrusion, will be increased 30 per cent by mid-1958. Construction under way will double production of "Teflon" 6 and "Teflon" 30 by late 1957.

New Miniature and Sub-Miniature Wires and Cables

Rockland Insulated Wire & Cable Co., Inc. Haverstraw, N. Y., has announced the development of a planetary cabling machine for insulated miniature and sub-miniature cables with individual wires as small as #32 AWG. The use of planetary equipment eliminates many of the problems associated with the cabling of miniature wire. A costly harness or a number of individual, bulky wires often can be replaced by a special cable, incorporating shielded and unshielded pairs, triples, and other multiples, as well as single conductors.

★ ★ ★

Among the outstanding characteristics of these miniature cables are extreme flexibility, small size, light weight, neat appearance and solderability. Various plastic formulations are available for a range of operating temperatures and

The NEWEST!

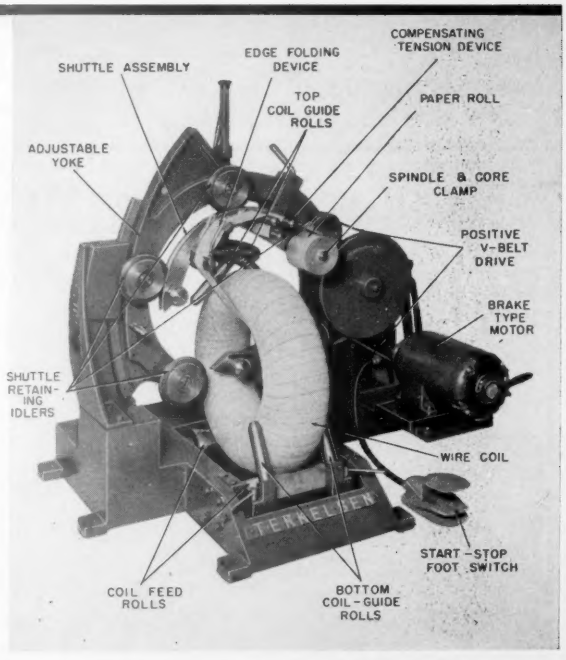
TERKELSEN'S *Model 4-57*

WRAPPING MACHINE

Wraps wire coils 17" to 30" outside diameter, minimum inside diameter of 10", and with a cross-sectional diameter of up to 10". Larger coil capacities available on order.

FEATURES:

- **POSITIVE V-BELT DRIVE.**
- **HIGH-SPEED PRODUCTION** *unequalled by any machine.*
- **TIGHT & UNIFORM WRAP** *of every coil.*
- **BALL-BEARINGS THROUGHOUT.**



For additional information on the Model 4-57 or any of our other 20 standard spiral wrapping machines (for either coils or straight lengths), write to:

TERKELSEN *Machine Company*

Terkelsen Building — 326 A Street, Boston 10, Massachusetts

World's Largest Manufacturer of Spiral Wrapping Machines

Member WAS

other physical characteristics.

★ ★ ★

In addition to supplying miniature constructions, production time on this cabling equipment is available for the manufacture of prototype quantities of special cables of larger gauge sizes. These often have been unobtainable in the past, due to the high set-up costs associated with conventional planetary cabling machines.

★ ★ ★

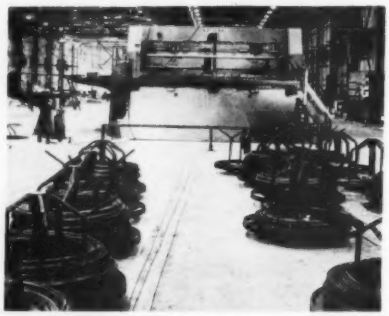
Bulletin 1-57 describing these cables, with samples attached, is available from the company on request.

AS&W Starts Welded Fabric Machine at Cleveland

Cleveland's first welded wire fabric machine began operating at the Cuyahoga Works of **U.S. Steel's American Steel and Wire Division** on May 15th.

★ ★ ★

Amid a gathering of company officials, **Mayor William R. Gerdon** of Cuyahoga Heights pushed the starting button which sent the wire-eating giant into action and almost at once the steel fabric began to snake out of the machine.



In one continuous operation, the wire is fed off the reels into the machine, cross wires are welded to longitudinal wires, and the welded wire fabric emerges from the other end and is coiled on the take-up reel.

★ ★ ★

A second machine will be in production "within the next few weeks," Wire Division officials indicated.

The welded wire fabric machines —known affectionately as "industrial spiders"—are monstrous machines more than ten feet tall and 132 feet in length. Mounted to the rear of the machines are 49 reels containing from two to four miles of wire.

★ ★ ★

Each machine will produce some 1700 tons of welded fabric a month at capacity operation.

Adds Two Distributors

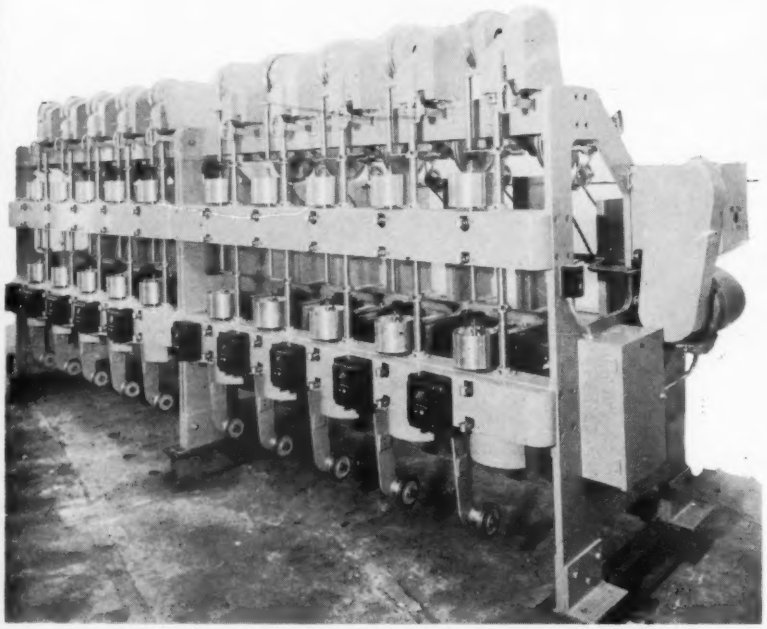
It was recently announced by **A. C. Towne Jr.,** President of **Michigan Oven Company,** Detroit, that their distributor group had been enlarged by two additions:

M. D. Brandwine
Brandwine Equipment Company
St. Louis, Missouri
William J. Boschert
Brandwine Equipment Company
Kansas City, Missouri

★ ★ ★

These companies will serve the entire areas surrounding the cities in which they are located.

2D-10-MBB INSULATION WINDING MACHINE No. 1129



APPLIES DOUBLE COVER TO 10 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B&S GAUGE (.057″ TO .018″ or 1.450MM TO .455MM). STANDARD CAPSTANS 8″ DIAMETER. SUPPLY WIRE LETOFFS AND TAKE-UPS ARE AT REAR OF MACHINE NOT SHOWN. MACHINE CAN BE ARRANGED SPECIAL WITH 12″ DIAMETER CAPSTANS FOR HEAVIER WIRES.

EST. 1855 AIMCO INC. 1915
"American" AIM INSULATING MACHINERY COMPANY
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FAIRHILL AND HUNTINGDON STREETS
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Michigan Oven Company manufactures and designs industrial oven systems for a wide variety of industries.

Bird Builds Perfect Nest

Frank Lloyd Wright, move over —as an architect you've been topped! There's a bird in Fort Wayne, Indiana, that has designed the perfect home. This home will never wear out, is built with a material that can easily be kept clean, is unusually strong and will not corrode or rot away. What is this? The wise bird has been gathering strands of fine stainless steel wire and making off with it to build a nest. The stainless is supplied by **Allegheny Ludlum Steel Corporation** to **Fort Wayne Metals, Inc.**, who make unusually fine filters for automotive and aircraft uses and special high pressure cables. Now the clever bird can nestle down in its feather-soft home without a care in the world for no architect could have chosen a better material.

New Fast Rotary Die Threader

A new Rotary Die Threader, built by **The Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn., is designed for profitable thread rolling production on long or short runs.

★ ★ ★

Using a circular die and die segment, the machine can thread all types of machine screws as well as other headed parts. The threader will handle blanks from 1/4" to 2" long and thread diameters from #6 to 1/4". Production rates on blanks of conventional screw materials such as steel, brass and other alloys range from 200 to 600 per minute. Stainless steel blanks can be threaded at from 60 to 200 per minute.

★ ★ ★

A safety device in the flywheel protects the dies if an oversize, bent or deformed blank comes through the feeding chute. This device consists of a shear pin that allows the flywheel to free-wheel when the pin is sheared.

★ ★ ★

For further information please write the company.

New Extruder Feed Developed

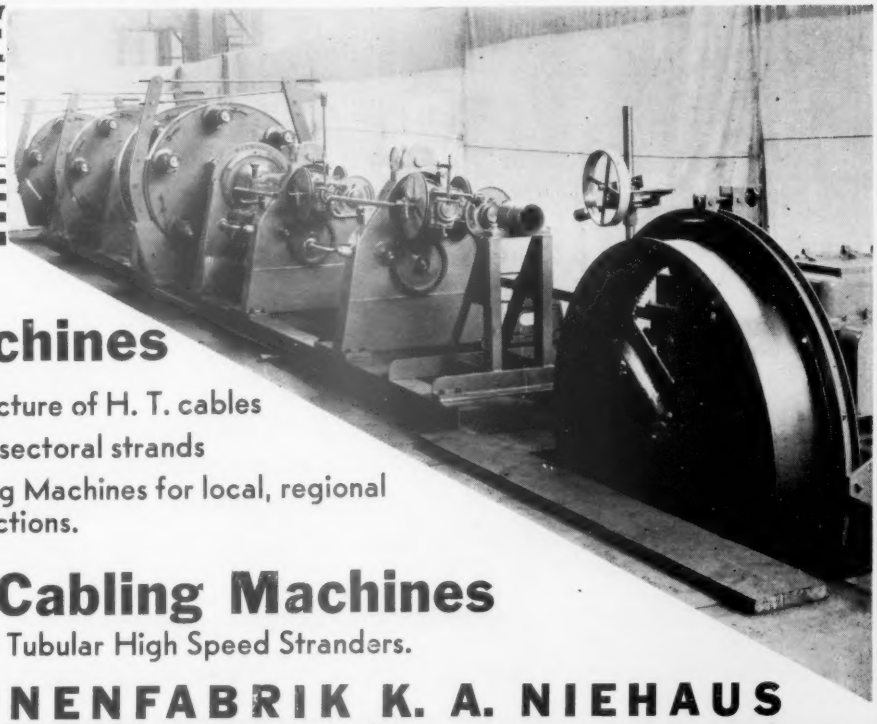
A Pressure Roller Feed Rubber Extruder*, excellent for Butyls, Silicones and other low-tensile stocks, has been developed by Davis-Standard.

★ ★ ★

The Pressure Roller Feeder consists of a highly polished roller driven by a torque-limiting clutch and of a filler block added to the extruder feed throat. As the screw becomes fully fed, the filler block forces the stock against the roller. When the resistance pressure thus created reaches a pre-set amount, the torque-limiting clutch begins to slip and allows the roller to slow or stop until the feed section can accept more stock.

* Patent Pending

NIEHAUS



Cabling Machines

Machines for the manufacture of H. T. cables
Machines for pretwisted sectoral strands
Telephone Strand Cabling Machines for local, regional and long distance connections.

Wire Rope Cabling Machines

Rope Closing Machines. Tubular High Speed Stranders.

MASCHINENFABRIK K. A. NIEHAUS

Phone: Nr. 65551 DÜSSELDORF-RATH GERMANY. Cables: Nehus

5th European Fair of Machine-Tools, Hannover 15-24.9.1957. Hall 8A Stand 8908

The constant forced feed greatly improves uniformity of extruder delivery, with control within 1% on stocks that formerly were difficult to feed even by hand. Ball regurgitation which often causes starvation of the screw is prevented. A scraping knife prevents build-up of stock film on the roller, thereby reducing supervision of the extruder.

★ ★ ★

For further details write, wire or call **Davis-Standard, Division of Franklin Research Corp.,** Mystic, Conn.

New Hook Up Wire For Business Machines

A new thin-wall insulated hook-up wire, not requiring an overbraid or thick jacket, costing 25% less initially having the advantages of less contact resistance when penetrating terminals are used, a minimum effect of humidity changes, elimination of wire breakage, less interwire capacitance, easier and more effective inspection and greater conductivity for the same overall O.D. wire, has been developed by **Rome Cable Corporation,** Rome, N. Y. It is approved by Underwriters' Laboratories for 80 degree C operation.

★ ★ ★

The new wire, a copper conductor, either solid or stranded, with a thin-wall of Synthinol covering, was specially designed for one of the world's leading electrical business machine manufacturers to eliminate the fraying, flaking, humidity and breakage problems common with the older types of wire.

★ ★ ★

Breakage solved by increasing the conductor size from 24 to 22 A.W.G., without increasing the overall O.D. Dimensions of the new hook-up wire are .051 for stranded (conductor alone .030) and .46 for solid (conductor alone .025). The specially formulated Synthinol covering is highly resistant to cut-through and penetration, eliminating the need for bulky protective coverings.

★ ★ ★

For further information contact the Sales Service Department, Rome Cable Corporation, Rome, New York.

Gas Chemistry For Heat Treating

New 8-page bulletin outlines modern gas chemistry and its ability to upgrade and protect metals in quality heat treating.

★ ★ ★

The principal factors in atmosphere heat treating—the furnace, the gas generator and the controller—are described and illustrated.

★ ★ ★

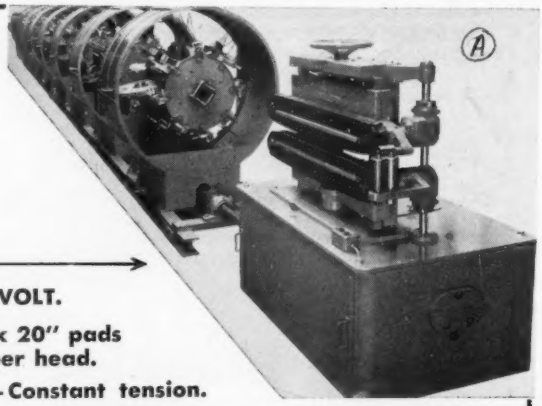
This bulletin devotes a chapter to carbon control, with installation pictures and a chart for the use of generated gas atmospheres.

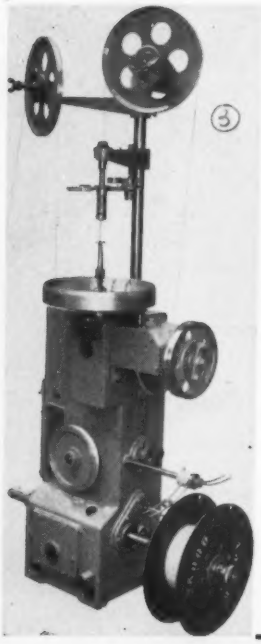
★ ★ ★

Request Bulletin SC-178 from Surface Combustion Corporation, Toledo 1, Ohio.

NEW...

IN PAPER LAPPING





FOR TELEPHONE
— High speed paper lapping.
— 3,000 r.p.m.
— Movable drum.
— Automatic stop.
— 12" pad.
— Electric counter.
— Central lubrication.

FOR HI. VOLT.
— 8 x 20" pads per head.
— Constant tension.
— Extensible pad centre.
— Individually braked.
— Variable die.
— Caterpillar haul-off.
— P.I.V. drive.
— Automatic stop.

POURTIER MACHINES
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ROMAINVILLE (Seine) FRANCE

COPPER - Consumption of refined copper in the United States, February-March 1957, in short tons

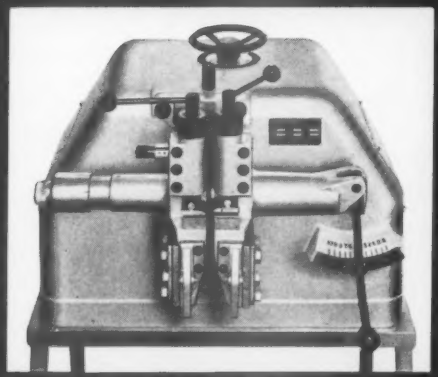
	Wire mills 1/	Brass mills 2/	Chemical plants	Secondary copper smelters	Foundries and miscellaneous	Total
February:						
Cathodes	473	6,605	(3)	42	(3)	7,120
Wire bars	62,421	4,852	(3)	---	(3)	67,273
Ingots and ingot bars	1,495	6,976	(3)	144	(3)	8,615
Cakes and slabs	------	14,057	(3)	---	(3)	14,057
Billets	------	11,934	(3)	---	(3)	11,934
Other	------	------	(3)	72	(3)	72
Total	64,389	44,424	(4)	258	(4)	4/112,071
March:						
Cathodes	721	6,716	(3)	67	(3)	7,504
Wire bars	66,409	4,898	(3)	---	(3)	71,307
Ingots and ingot bars	1,503	5,777	(3)	130	(3)	7,410
Cakes and slabs	------	13,348	(3)	---	(3)	13,348
Billets	------	11,524	(3)	---	(3)	11,524
Other	------	------	(3)	54	(3)	54
Total	68,633	42,263	(4)	251	(4)	4/114,147

1/ Includes all wire mills with rod-rolling facilities. 2/ Includes all brass mills using copper in refinery shapes; some have rod-rolling facilities. 3/ Not available. 4/ Consumption by chemical plants, foundries, and miscellaneous plants not included. Estimate of 3,000 tons included in total.

Microweld SCHLATTER

the world's leading wire welding machines

Schlatter welders, provided with automatic annealing-device, will give perfect welds on high carbon steel and patented wires.



Wire butt welder type M
for steel, brass, aluminium and copper.
Welding range:
Steel . . . . . 0,157" — 0,512" ø
Copper . . . . . 0,157" — 0,374" ø

MICROWELD wire welder type E
Four different models for butt welding of steel, copper, brass and aluminium.
Welding range:
Steel . . . . . 0,039" — 0,315"
Copper . . . . 0,039" — 0,236"

H. A. SCHLATTER LTD ZOLLIKON/ZÜRICH (SWITZERLAND)
Manufacturers of electric welding machines

Sole Representative: PAUL REICHER MACHINERY & EQUIPMENT, P.O. Box 127, Willowdale, Ont, Canada

AMERICAN IRON AND STEEL INSTITUTE
150 EAST FORTY-SECOND STREET, NEW YORK 17, N. Y.

AIS 10

Total Number of Companies Included 128

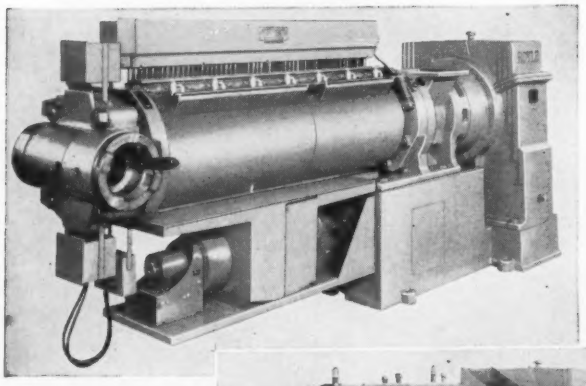
APRIL - 1957
Month

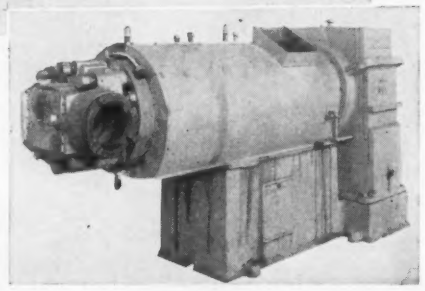
SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	CURRENT MONTH 1957 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1956) Percent of Total Shipments	YEAR TO DATE 1957 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1956) Percent of Total Shipments
Ingots and Steel Castings	1A	19,611	19,004	3,133	41,748	0.6	0.8	91,867	71,099	8,646	171,612	0.6	1.0
Blooms, slabs, billets, sheet bars	1B	168,025	42,287	2,851	213,163	2.9	2.7	* 713,548	177,159	10,385	* 901,092	3.0	2.9
Tube rounds	1C	7,367	28	-	7,395	0.1	-	31,653	1,477	-1	33,129	0.1	-
Skelp	2	12,812	-	-	12,812	0.2	0.2	69,583	-	-	69,583	0.2	0.2
Wire rods	3	80,958	1,524	472	82,954	1.1	1.3	345,909	7,273	* 1,819	* 355,001	1.2	1.3
TOTAL SEMI-FINISHED		288,773	62,843	6,456	358,072	4.9	5.0	* 1,252,560	257,008	* 20,849	* 1,530,417	5.1	5.4
Bars—Hot rolled (incl. light shapes)	14	559,225	122,600	5,271	687,096	9.4	10.3	* 2,397,466	542,524	23,196	* 2,963,186	9.9	10.6
Bars—Reinforcing	15	216,492	-	-	216,492	2.9	2.9	* 913,273	329	-	* 913,602	3.0	2.6
Bars—Cold finished	16	93,125	19,100	5,338	117,563	1.6	2.1	405,412	88,265	23,146	516,823	1.7	2.2
Tool steel	17	1,062	8,017	-	9,079	0.1	0.2	4,933	32,917	-	37,850	0.1	0.2
TOTAL BARS AND TOOL STEEL		869,904	149,717	10,609	1,030,230	14.0	15.5	* 3,721,084	664,035	46,342	* 4,431,461	14.7	15.6
Wire—Drawn	23	217,438	3,932	2,587	223,957	3.0	3.6	892,667	16,985	* 10,103	* 919,755	3.1	3.6
Wire—Nails & staples	24	40,411	-	-	40,411	0.5	0.6	158,366	-	2	158,368	0.5	0.6
Wire—Barbed & twisted	25	7,568	-	-	7,568	0.1	0.1	27,421	-	1	27,422	0.1	0.1
Wire—Woven wire fence	26	28,102	-	-	28,102	0.4	0.4	95,127	-	-	95,127	0.3	0.4
Wire—Bale ties	27	3,900	-	-	3,900	0.1	0.1	16,474	-	-	16,474	0.1	0.1
TOTAL WIRE & WIRE PRODUCTS		297,419	3,932	2,587	303,938	4.1	4.8	1,190,055	16,985	* 10,106	* 1,217,146	4.1	4.8
Sheets—Hot rolled	31	651,418	24,906	3,240	679,564	9.3	10.2	2,889,087	110,882	9,935	3,009,904	10.0	10.6
Sheets—Cold rolled	32	889,275	3,578	14,328	907,181	12.3	15.3	4,176,039	15,896	56,346	4,248,281	14.2	16.4
Sheets—Galvanized	33	198,553	32	-	198,585	2.7	3.4	846,333	32	-	846,365	2.8	3.5
Sheets—All other coated	34	15,926	-	-	15,926	0.2	0.3	71,121	-	-	71,121	0.2	0.3
Electrical sheets & strip	36	8,337	50,283	-	58,620	0.8	1.0	36,306	206,034	-	242,340	0.8	1.0
Strip—Hot rolled	37	112,568	2,320	561	115,449	1.6	2.0	528,812	12,257	2,367	543,436	1.8	2.2
Strip—Cold rolled	38	79,346	1,498	14,320	95,164	1.3	1.9	354,246	6,268	72,182	432,696	1.5	2.0
TOTAL SHEETS AND STRIP		1,955,423	82,617	32,449	2,070,489	28.2	34.1	8,901,944	351,369	140,830	9,394,143	31.3	36.0
TOTAL SHIPMENTS (1957)		6,864,901	426,594	58,257	7,349,752	100.0	xxx	* 27,998,470	1,786,498	244,429	* 30,029,397	100.0	xxx
TOTAL — PRIOR YEAR (1956)		7,206,375	519,368	58,130	7,783,873	xxx	100.0	28,667,276	2,187,164	236,765	31,091,205	xxx	100.0

* Revised





8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.

EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

JOHN ROYLE & SONS — ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

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Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

PRIMARY ALUMINUM PRODUCTION IN THE UNITED STATES
(in short tons)

1957	
April	138,728
March	* 135,706
Total for the year through April	540,523
1956	
April	144,727
Total for the year through April	563,778
All-time record month	
July 1956	151,624
All-time record quarter	
4th 1956	442,597

* Revised from previous report

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Association Holds Fine Two-Day Regional Meeting in Canada

(*Continued from page 780*)

of enamelled wires.

★ ★ ★

Wire drawing followed the conventional arrangements of machines and operations in the drawing of copper wire from purchased rod in sizes of 1/4" to 5/8" diameter. Other operations seen included annealing and stranding.

★ ★ ★

Since arrangements were concluded to visit this plant, the business was bought by **H. K. Porter Co. (Canada) Ltd.** and is now a part of the large group of Porter affiliates, going under the name Federal Wire & Cable Division.

★ ★ ★

Besides magnet wire, the company produces ACSR cable, aircraft, annunciator, armored, BX, automotive, service entrance, weather-proof, appliance, building, fixture, radio, telephone, cord and other types of wires.

The Greening Tour

Another group of more than 50 persons left at the same time to visit the **B. Greening Company's** wire mills, of interest to both ferrous and non-ferrous men, but naturally, not to those whose primary concern is electric wire.

★ ★ ★

The Greening mill, as to plant layout, equipment and the success with which the company conducts its numerous operations, was most impressive. The company works in iron, steel, stainless steel, brass, bronze, phosphor bronze, copper, nickel silver, monel, nickel, nickel alloys and zinc wires to produce wire rope, screen cloth (fine and coarse) poultry netting and many other products. The plant is primarily a fine wire mill.

★ ★ ★

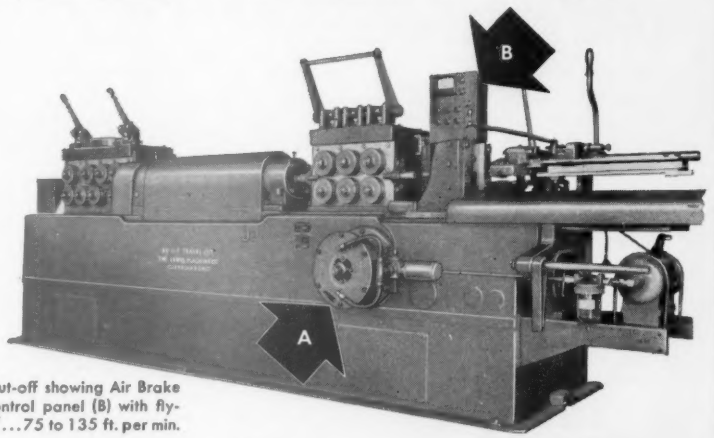
In the wire mill production starts with Canadian made purchased rod, approximately 1/4" in

SUPERIOR QUALITY CONTROL!

WITH LEWIS TRAVEL-CUT WIRE STRAIGHTENING AND CUTTING MACHINES EQUIPPED WITH AIR CLUTCH, AIR BRAKE AND VARIABLE SPEED DRIVE

Lewis engineers have added three important improvements to their famous Travel-Cut Wire Straightening and Cutting Machines, 1. Wichita Air Clutch, 2. Wichita Air Brake, 3. Reeves Motodrive or similar variable speed drive, for SUPERIOR QUALITY CONTROL. Assures greater accuracy and produces quality rod with a minimum of spot swell. Lewis Machines are available in 34 models to handle from .012" to ¾" dia. at speeds up to 200 FPM.

NEW BROCHURE ON REQUEST



No. 11-F Travel-Cut with Flying Shear Cut-off showing Air Brake (A) (guard removed) and push-button control panel (B) with flywheel speed tachometer. Cap. ½" to ¾"...75 to 135 ft. per min.

THE LEWIS MACHINE COMPANY 3440 EAST 76th STREET CLEVELAND 27, OHIO

Wire dies have longer life when finished with HYPREZ DIAMOND COMPOUNDS

For every job, Hyprez quality, economy and dependability are recognized as unsurpassed. Your nearby Hyprez distributor will help you solve any difficult lapping or finishing problem that may arise.

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diameter, which is drawn to required sizes for the end uses to which each will be put.

★ ★ ★

A Research Department, under the able direction of **J. W. Galloway,** is an important part of the Greening set-up and through it new ideas, processes and developments are established for the many metals in which the company works.

★ ★ ★

Those who were fortunate enough to be able to take this tour were pleased with the opportunity afforded to visit this interesting and versatile plant.

★ ★ ★

These plant tours concluded the official activities of the Canadian Regional Meeting. The two days had not only been gratifyingly full of matters of interest and entertainment, but were handled in such manner that those in attendance were well rewarded for the time spent in Hamilton. The meeting was highly successful from every angle.

The Ladies

For the ladies coming to Hamilton with their menfolk, besides being able to attend the cocktail party and dinner on Monday, the Ladies Committee, comprised of Mesdames **Boyd, Dove, Globe, Rutherford** and **Waters,** arranged a Coffee Party at **Henry Birks and Sons** on Monday afternoon and on Tuesday morning took a group of ladies to Bonhomme's Garden Center and Niagara Falls, Ontario, where they had lunch at the Sheraton Brock Hotel. After this they were motored back to Hamilton via historic Queenston Heights.

The Program Committee

All credit for the success of the meeting, which Mr. Girdler characterized as the best Regional Meeting to date, is due **Allan B. Dove,** Program Chairman, and his very competent Committee. The Committee responsible for the planning of the affair were:

Laurence Atkinson, Frost Steel & Wire Co. Ltd.

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STREAMLINED PRODUCTION LINE COMPLETE WITH MODERN *W.E.I. Dual Worm Compounder-Extruders!*

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PRECISION REPROCESSING *Plandex "Up-Grades" Your Scrap*

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Maurice Boyd, (Canada Works) Steel Co. of Canada, Ltd.
Allan B. Dove, The Steel Co. of Canada, Ltd.
George Globe, The B. Greening Wire Co. Ltd.
Ralph Rutherford, The B. Greening Wire Co., Ltd.
H. W. Waters, (Parkdale Works), The Steel Company of Canada, Ltd.

★ ★ ★

Responsibilities for various activities were assigned as follows:

Mr. Atkinson—Publicity
Mr. Boyd—Treasurer
Mr. Dove—Chairman
Mr. Globe—Transportation
Mr. Waters—Hotel

★ ★ ★

In addition to the foregoing there were others who aided the Committee in many important ways, for which we are grateful, even though their services are not recorded. These are the unsung heroes of the meeting.

★ ★ ★

The Officers and Directors take this opportunity to express their heartfelt thanks to the Committee for its thoughtful and efficient work, the rewards of which may come to each one principally in the satisfaction of knowing that the job was superlatively well done.

NAM Issues Booklets on Labor Relations

The National Association of Manufacturers has issued three new booklets that should be of interest and value in dealing with employees. These are:

"Dealing with Employees as Individuals" (25c)
"Improving Human Relations" (50c)
"Employers' Rights and Obligations Under the Taft-Hartley Act" (25c)

★ ★ ★

Copies of these booklets may be ordered from NAM by addressing its Program Dept., 80 Boyleston St., Boston 16, Mass.

Plating Company Moves

The City Plating Works, Inc., formerly of Bridgeport, Conn., has announced its removal to a new

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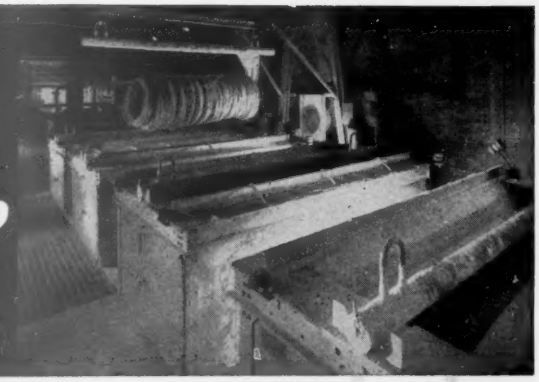
HI-SPEED REGISTERED
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

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2,235,559
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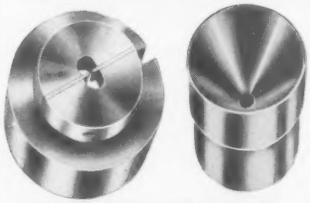

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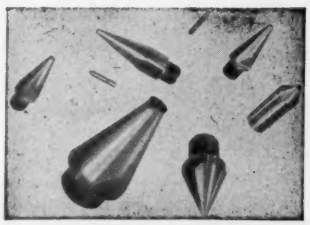

CARBIDE EXTRUSION NOZZLES OR TIPS FOR ALL MACHINES.

BRIDGEPORT CARBIDE NOZZLES have phenomenally long life, will lower operating costs and reduce wire breakage.

BRIDGEPORT STEEL DIES are made in Round, Figure 8, Serrated, Tracer and other Special Shapes to your specifications. A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed and reassembled quickly and easily. Made for 2 and 3 conductor wires to be coated in extrusion machines.

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Export Dept. ANDOVER INTERNATIONAL INC., 10 BRIDGE ST., NEW YORK 4, N. Y.
CABLE Address ANDONIK
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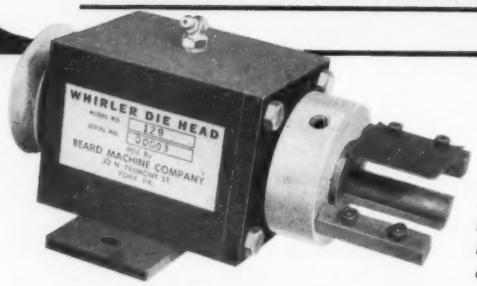
CUT COSTS OF APPLYING ASBESTOS INSULATION



Beard Whirler Die Head model No. 129 with 9/16" die holder . . . 3/8" and 3/4" holders also available.

NEW BEARD WHIRLER DIE HEAD AND DIES HANDLE OVER 100 DIFFERENT WIRE SIZES. IMMEDIATELY AVAILABLE!

Want uniform wire insulation of highest dependability . . . at lowest possible cost? Use modern Beard Whirler Heads and Dies in your asbestos insulating system. Beard dies are immediately available to accommodate more than 100 wire sizes. Can be used as wet whirlers and polishing heads, too. If you want flexibility, simplicity of operation, and big savings of time and labor — write for detailed data sheets and full information NOW!

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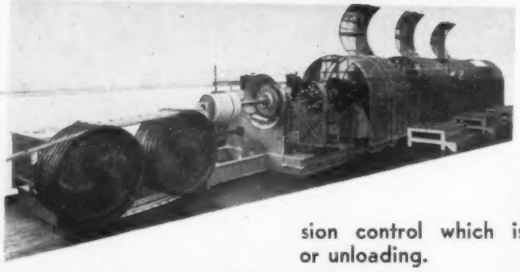
4-WIRE TWISTING MACHINES



CRADLE REELS

diameter 48" overall width 31½".

FILLER HEAD 24 Packages 12" diameter by 12" Traverse with adjustable tension control which is not affected by loading or unloading.

SERVING HEAD AIMCO plate type flyer with six spindles accommodating yarn packages 6" diameter 4" traverse.

BINDING HEAD AIMCO plate type flyer with two spindles accommodating yarn packages 3" diameter 5" traverse.

Either type is driven thru clutch, variable speed device and Gilmer belts from the constant speed shaft.

TAPING HEAD is of the constant tension type and accommodates a pad 24" in diameter and up to 4" in width. It is driven thru clutch, variable speed device and Gilmer belts from the constant speed shaft.

CAPSTANS 6 groove 42" root diameter. Rates of lay from 3" to 50". Flyer speed 8 steps from 600 to 34 R.P.M. Handles large diameter wires on cradle reels.

An exceedingly efficient and versatile machine.

THE EDMANDS CO. 860 WELLINGTON AVE., CRANSTON 10, R. I.

plant at 905 Honeyspot Rd., Stratford, Conn., as a result of its old quarters having been in the path of the new Connecticut Throughway.

★ ★ ★

While the company operates a job shop for all kinds of plating, it has been active in the wire industry for a number of years in the hard chrome plating of wear parts of wire equipment, as, for instance, capstans and blocks, on wire drawing machines, guide rings, sheaves and other parts subject to excessive wear if not so protected.

Improved Thickness Control of Lead-Sheathed Cable by Ultrasonic Gauge

(*Continued from page 775*)

extrusion pressure, thus reducing extrusion speed. This has the immediate effect of increasing average and minimum thickness and of improving concentricity. This is illustrated at points "a" and "b" in Fig. 3.

(2) In extreme cases, which are rare, where the tendency to thin out and become eccentric persists for several charges, it is necessary to stop the press and tap open the die nut slightly, increasing wall thickness. This may be resorted to in sheathing long lengths of submarine cable, involving fifty or more charges of lead.

(3) If one side of the sheath is becoming eccentric relative to the other, the operator can increase the block temperature on the side with the thinner lead. There is, of course, a time delay in a temperature adjustment so that it may take 10 to 20 minutes before the change in thickness occurs.

The Effect of the Ultrasonic Gauge on Cable Specifications for Customers

We have just seen how the ultrasonic gauge is used to maintain sheath thickness within the specified limits. In a review of the various customer cable specifications, we find that sheath thickness is specified in different ways.

★ ★ ★

British specifications for power cable, for example, contain a requirement for **minimum** thickness, but rarely for average thickness.

★ ★ ★

Our Canadian specification,

CSA C68(A)-1953, has a requirement for both **average** and **minimum** thickness. The American AEIC specification for power cable (8th and 9th editions) goes one step further than its Canadian counterpart and stipulates a requirement for the eccentricity of the sheath. Eccentricity is there defined as:

$$\frac{\text{Average Thickness - Min. Thickness} \times 100}{\text{Average Thickness}}$$

X

expressed as a per cent,
and the maximum allowed is 15%.

★ ★ ★

This additional requirement recognizes that eccentric sheath is objectionable even if the minimum thickness specified is complied with. In eccentric sheath the stress concentrations in the thin sections are greater than if the sheath was uniformly thin.

★ ★ ★

In all specifications, thickness measurements are required on sheath samples taken from the ends of factory lengths and these samples are assumed to represent the entire length. Through the records taken by the ultrasonic gauge on a cable run, it is now possible to have a more accurate picture of sheath thickness along the whole cable than that gained from end samples. The existence of this type of gauge therefore suggests a new approach to the requirements of our cable specifications, as thickness data is on file for each length of cable.

Conclusion

I have described the use of a practical, accurate gauge which checks lead thickness during extrusion and enables us to control it more closely to customer's specifications.

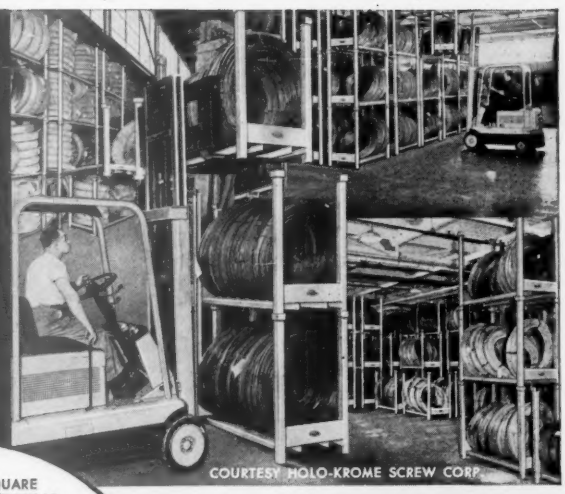
★ ★ ★

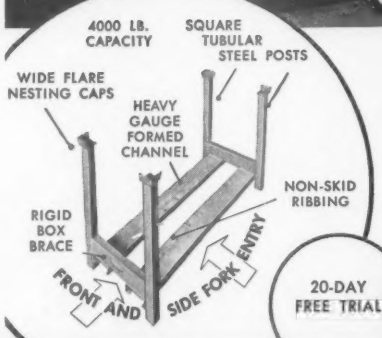
Besides its use in routine production, we intend to explore other uses for the ultrasonic gauge, among which are:

(1) **To assess improved methods of extrusion quickly.**

(2) **The use of automatic controls or alarm devices connected to the ultrasonic gauge. We can envisage the press operator presetting his alarm to a minimum thickness value and have a warning**

JARKE
PORTABLE
WIRE COIL RACKS





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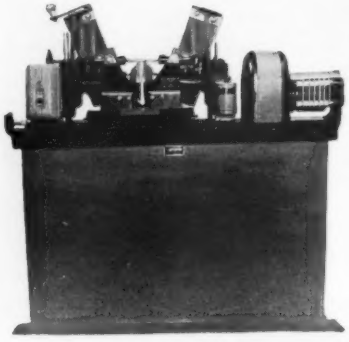

Many of our machines have been in service up to 10 years. Our later MODEL "526" (pictured), with a capacity of 5/16" to 6", is now the accepted leader in the scrap and salvage trade. Strips short or long lengths, or off the reel.

For FAST and CLEAN CUTTING, in most cases actually taking the cable apart. No other machine can match the patented cutting action of the "526".

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bell sound when he approaches this value. Or ideally, introduce a feedback system where information relayed from the ultrasonic gauge will automatically adjust thickness to the desired limits.

Acknowledgments

The author gratefully acknowledges the assistance of the following people in the Montreal Technical Control Department:

To Messrs. Y. Trudel, F. Lauzon, and D. Vincent.

References

The Extrusion of Metals — Claude E. Pearson—Published 1944 by John Wiley & Sons Inc.

Miscellaneous literature by Branson Instruments Inc.

Stainless Spring Wire

(*Continued from page* 763)

The November, 1945, issue of Wire and Wire Products contains a paper by N. C. Talmadge entitled "Elastic Properties of Steel Wire Intended for Springs and Formed Parts." This paper also shows how variations in hard drawn wire from lot to lot can cause difficulties in forming unless these variations are considered and action taken.

Finishes

The austenitic steels are drawn with a lead coating. The wire is shipped with this coating unless otherwise specified as the lead will assist in minimizing galling during forming. The lead coating may be left on the wire after forming for many applications. However, if the wire is to come in contact with food or is to be stress relieved, the lead should be removed. Stress relieving is definitely recommended if it is necessary to obtain the maximum physical properties of the austenitic spring wires. Dipping the parts in a nitric acid and water solution of 10% to 15% acid by volume for about 15 minutes at room temperature will remove the lead. The wire may also be shipped bare for mandrel winding by hand if requested.

If it is necessary to improve the surface finish of the formed wire, this may be done by tumbling, centreless grinding, abrasive belt polishing, or electro-polishing. The selection of the most appropriate method will depend on the finish required, and the size and shape of the parts.

Mechanical Properties

The following typical mechanical properties of stainless spring wires is presented as a guide to assist in the design of springs. In view of the variation from heat to heat in properties of austenitic spring wire which has been shown in the foregoing paper, it is recommended that any critical design be based on tests of the actual wire to be used.

TABLE IV

TYPICAL MECHANICAL PROPERTIES OF STAINLESS STEEL SPRING WIRE

MECHANICAL PROPERTY	TYPES 302,304,316	TYPE 420
Modulus of Elasticity in		
Tension (E)	26.5×10^6 psi	28.5×10^6 psi
Torsion (G)	10×10^6	10.5×10^6
Elastic Limit in		
Tension	70% of U.T.S.	70% of U.T.S.
Torsion	50% of U.T.S.	50% of U.T.S.
Hardness, Rockwell "C" Scale	40 to 48	50 to 56

Rod Packaging

(*Continued from page* 770)

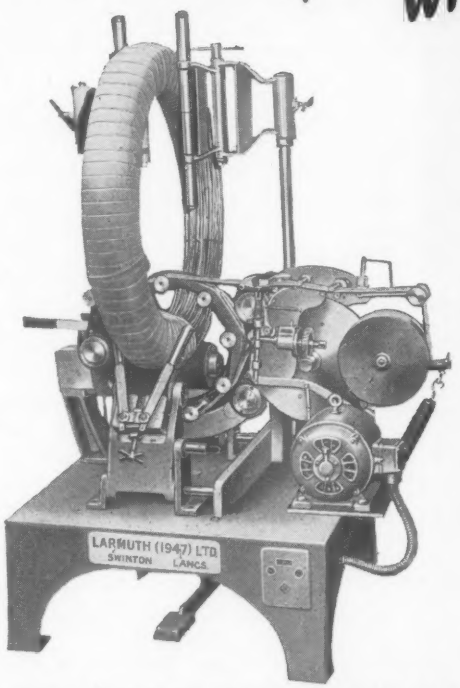
would give approximately 700 lbs less aisle allowance of 20 per cent or a net of 560 lbs per square foot. This compares with 300 lbs on a loose coil basis.

★ ★ ★

The above loadings can be increased in three ways:—

(a) By filling the valleys with common fast consumption grades. A colour code can be used to quickly identify the top grades. In most rod consuming plants there are two or three sizes or grades that are very active. Usually a quantity of these is used every day. What I am actually suggesting here is to temporarily cover the slow moving grades with fast moving grades. It is then a simple matter to uncover the slow sizes whenever they are required by simply moving the rods on top to the cleaning line. (see figure #3) This method could easily raise the loading by 25 percent.

LARMUTH *Spiral Wrapping* MACHINES



are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

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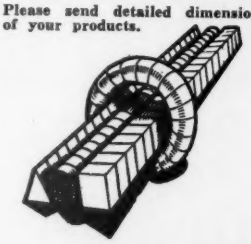

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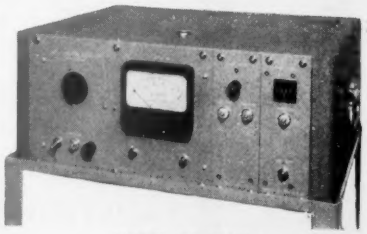
MORE EFFICIENT WIRE SPARKING ACHIEVED WITH
PESCHEL HV DC SPARKERS

- **FAST: For wire speeds up to 4000 ft/min.**
- **EFFICIENT: 1" Electrode sufficient. Save floor space.**
- **ACCURATE: Registers *EVERY* fault. *(Impossible with 36" electrode)***
- **NON-DESTRUCTIVE: No burning or marking of wire.**
- **SAFE: Non-lethal output (unlike AC Sparkers)**



MODEL 10 CV-X
(Floor stands available also)

SELF-TESTING AND EASY MAINTENANCE—Sectionalized construction, supervisory circuits and panel indicators enable quick location of defective section, which unplugs for quick removal and replacement with spare. Factory carries spares earmarked for this equipment and available for immediate air express shipment to any place in the world.

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Circle Wire and Cable Corp.	Kerite Company
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General Cable Corp.	Superior Cable Corp.
General Electric Co.	Tensolite Insulated Wire Co.
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MEETS IPCEA • NEMA • ASTM • USAF • MIL • JAN and ALL OTHER STANDARDS

Send for information on this new, efficient sparker

PESCHEL ELECTRONICS, INC.
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YOU NEVER KNOW

THE COST

OF A TOOL UNTIL

YOU HAVE TO

REPLACE IT!

UNLIKE SOME TOOLS

CAREW

CUTTING NIPPERS

don't have 1000 uses. They are made only for cutting wire.

CAREW NIPPERS will continue to do this year after year; cutting efficiently long after most tools have been junked.

MADE IN 4 SIZES

8", 10", 12", 14"

Jaws are made of hardened tool steel and are removable for sharpening.

STOCKED BY MOST MILL SUPPLY DEALERS

Made by

M. W. ROBINSON COMPANY

ROCKFALL, CONNECTICUT

(b) By using steel bins that eliminate losses caused by pyramid piling.

(c) Vertical Storage. Compact bundles make the vertical stacking crane far more attractive. In addition to increasing the weight per stack, it facilitates the withdrawal of unit cleaning loads.

★ ★ ★

Since we are now handling a unit package to and from storage, time is saved in identification as well as the handling. It is not possible for individual coils to become mixed with other grades. In the past, single coils did drop from the end of the hook and become mixed with an adjacent grade.

★ ★ ★

It is not necessary to have hookers on the ground or in the rail cars. These coils when handled by the conventional bridge crane can be unloaded and loaded by the craneman only. Under certain conditions it may be desirable to use a lift truck equipped with a boom to handle rods. With loose coils you all know that this is not too practical. With these packages it can be accomplished very economically.

★ ★ ★

The bundles can be stored on a flat surface with side stops only. On the outside rows of rod, we have found that 8 inch cement curbing blocks do the job nicely. Along the intermediate rows we are using 4" x 4" wooden blocks. We are not using end stops, but do insist that any piles over 3 high must be stepped back.

★ ★ ★

Identification tags are affixed to each coil of rod. These are placed on the inside of the coil and do not become disengaged from the coil during handling and storage.

★ ★ ★

Until we get a completely compacted bundle we will not be able to accurately determine our space savings. Already, however, we are beginning to notice a drastic reduction in the amount of re-handling. It is no longer necessary to individually bundle each coil of rod. This also was a costly job and our rod mill was very glad to see it eliminated. We feel that these two savings should offset the extra cost of compact bundling. After viewing

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Besides the direct benefits of being a member, those who join the Association can enjoy the feeling that they are uniting in the cooperative effort to better conditions in the industry.

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For this you receive the Association's Official Publication for one year—WIRE AND WIRE PRODUCTS.

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You also get a copy of the directory—the WIRE AND WIRE PRODUCTS BUYERS' GUIDE AND YEARBOOK OF THE WIRE ASSOCIATION.

•

You are entitled to a free question and answer service on technical and operating problems.

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You can attend the Annual Convention and the Regional Meetings of the Association at a saving in registration fees.

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Personal contacts, too, are an advantage of the meetings.

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RICHARD E. BROWN, Executive Secretary

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The Standard of the Wire Industry

some of the pictures we have, I think you will have a better idea of the improved handling made possible through the introduction of this package to our mills.

"Kel-F"* 500, New Fluorocarbon Wire Insulating Material

(*Continued from page 786*)

previously. 22 gauge 7/30 silver plated hookup wire was coated with unpigmented "KEL-F" 500-F experimentally, under conditions shown in Table II. The coating applied to wire was smooth, continuous and nonporous at a rate of 100-200 feet per minute.

TABLE II

OPERATING CONDITIONS

Material	"KEL-F" 500-F
ZST (sec) - Virgin Material	300
ZST (sec) - Coating on Wire	125
Die - Tip, °F. (T_7)	665
Mid, °F. (T_6)	660
Rear, °F. (T_5)	645
Adapter, °F. (T_4)	615
Barrel - Front, °F. (T_3)	540
Mid, °F. (T_2)	485
Rear, °F. (T_1)	400
Water Bath, °F	72
Screw Speed, rpm	9
Screw Cooled	Air
Hopper Cooled	Air
Full Length, Inches	6
Die to Bath Span, Inches	18
Spark Tester, Volts	7,500
% Shrinkage	73

Heat Aging and Electrical Tests

The wire produced under the operating conditions given in Table II were subjected to test according to MIL-W-12349. After aging one week, two weeks and five months at 150°C. and 175°C., the samples were tested for voltage breakdown. The results of these tests are given in Table III.

TABLE III

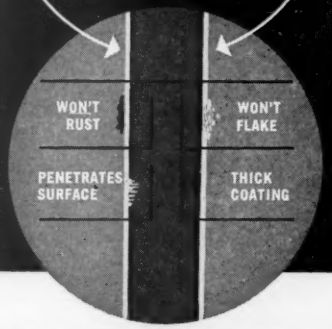
ELECTRICAL TEST

Temperature and Aging Period	Voltage Breakdown
Initial Value	13,500
150°C. - 1 Week	13,000
2 Weeks	14,600
5 Months	12,100
175°C. - 1 Week	13,500
2 Weeks	14,500
5 Months	5,200

The above data represent values obtained on a production lot; however, extensive test work on many production lots have given results of a similar nature.

Here's why you should coat high and low carbon steel rod with

BORAX 5 MOL.



No Dust... For a cleaner shop—pleasant working conditions and easier house keeping. Borax-coated rod does not dust or flake, can be held in storage longer and is pleasanter to handle.

No Baking... The Borax solution penetrates the porous surface of the metal, neutralizing deepseated acid, and eliminating the need for baking.

Longer Storage... The continuous film of Borax inhibits the formation of rust for a considerable period—particularly important where several days may elapse between coating and drawing.

Economical... A single dip in the Borax bath provides a thick durable coating which is very valuable where the wire is to be drawn in several stages.

Write to our Technical Department for further information.

United States Borax & Chemical Corporation
PACIFIC COAST BORAX COMPANY DIVISION
NEW YORK CHICAGO CLEVELAND KANSAS CITY PHILADELPHIA LOS ANGELES

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

Solves BIG-REEL handling problems

Lifts, tilts, turns loads up to 1500 lbs, easy!

If you shudder each time an employee crashes a big loaded reel on its side, then you should look into this special ACROMETAL handling equipment. It's a pneumatic reel lifter, used with a hoist, and it has a mechanically operated safety lock that holds reel in position if air supply should fail.

Note the trolley on the curved arm. That makes it easy to pick up a reel in any position, turn it to horizontal or vertical, swing it to a pallet. Maneuvering 1500 lb. loads is no job at all—even a girl can do it. Lifter will handle reels with 5" arbors, up to 30" diameter and maximum overall width of 13½".

No more bouncing or crashing on floor to change reel position

One plant manager said this equipment would save him $10,000 a year on floor repairs alone—to say nothing about the cost of repairing damaged reels. It eliminates a major accident hazard and insures against distorting the lay of the wire. This lifter treats your wire and reels with respect! **Write or call us.**

ACROMETAL PRODUCTS, INC.
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MARKING WHEELS and MACHINES for ELECTRIC WIRE

Gillies Engraved Concave Wheels are widely used for printing on rubber or plastic coated wire, for code or manufacturer identification. Machines print on ONE or BOTH SIDES in large legible letters. Wheels adaptable to any machine or we will supply machines. Wheels, shafts, ink pans and all accessories readily removable for quick and easy cleaning. Wheels of TOOL STEEL, HARDENED to Rockwell test 61-64 and HARD CHROME PLATED.

Send for samples of wire and prices on wheels and equipment

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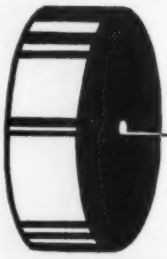
Telephone: West Boylston TE 5-4445

FOR WET DRAWING AND CLEANING COMPOUNDS
SPECIFY



PERMAG

For more than 33 years, Magnuson Products Corporation has helped solve difficult wire drawing and cleaning problems at considerable savings.

Write, wire or phone today and find out how Magnuson can help you expedite production.

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Summary

"KEL-F" 500-F retains the same extreme chemical resistance, low temperature flexibility, outstanding electrical characteristics, zero moisture absorption, high mechanical and physical properties, and abrasion resistance as our regular "KEL-F" grades 270 and 300. The foregoing characteristics are of special interest to the wire coating field. In addition to these qualifications, "KEL-F" 500-F offers higher continuous heat aging resistance, namely, at temperatures of 150° to 175°C., greater flexibility and improved resistance to radiation. This new material is offered to you members of the wire and cable field for test and evaluation and eventual industrial or military use.

An Elementary Mathematical Treatment of Cable Taping

(*Continued from page* 783)

the possibility that the foregoing equation may be needed in terms of the independent variables, these are given below:

For Butt Applications:

$$\lambda = 3.142 \cdot (D + t)/W$$

For Spaced Applications:

$$\lambda = 3.142 \cdot \frac{D + t \cdot \frac{W}{W + Q}}{W + Q}$$

For Lapped Applications:

$$\lambda = 3.142 \cdot \frac{D + t \cdot \frac{W + 2Q}{W}}{W - Q}$$

Weight of Tape per 1000 feet of Cable

The weight of tape, in pounds, used to cover 1000 feet of cable is given by the expression:

$$G = kA$$

where G = Weight in pounds, per 1000 feet
A = Area, in square yards, of tape per 1000 feet

k = Weight in pounds of 1 square yard of tape*

but, $A = \lambda W/(36 \times 3)$ square yards

where, λ = Length of tape in feet per 1000 feet

W = Width of tape in inches

hence, $G = \lambda kW/108$

but, $\lambda = 1000 \text{ Sec } \theta$

therefore, $G = 9.259 \text{ kW Sec } \theta$

* Each tape material has its own value of k and depends upon material, coating, reinforcement, etc. Values of k are obtained either by direct measurement or from the manufacturer.

★ ★ ★

If the value of G must be established in terms of the independent variables, the equations below may be used:

For Butt Applications:

$$G = 29.088\ k\ (D+t)$$

For Lapped Applications:

$$G = 29.088\ k\left[D+t \cdot \frac{W}{W+Q}\right]$$

For Spaced Applications:

$$G = 29.088\ k\left[\frac{D+t}{W-Q} \cdot \frac{W+2Q}{W}\right]$$

Scovill Lays Cornerstone For New Tube Mill

Scovill Manufacturing Company helped to celebrate the 250th anniversary of New Milford on May 7th, when William M. Goss, President, laid the cornerstone for its New Milford Tube Mill. It is the first time that the 155 year old company has gone outside of the City of Waterbury in its mill operations.

★ ★ ★

The new Tube Mill to be erected on what will be called "Scovill Street", will be 1,150 feet long, 42 feet high, 288 feet wide at the end nearest the railroad and 208 feet wide at the opposite end, containing a total of about 275,000 square feet on 72 acres of land. The very latest production equipment will be installed, that will bring automation to a point not reached before in the tube industry, through the use of many automatic and semi-automatic machines.

WE BUY WE SELL

We Pay Highest Prices for Used Machinery

250—MOSSBERG STEEL REELS 24 x 12 TRAVERSE.

1—NEBUTTCO 6-BAY VERTICAL TWISTER, COMPLETE WITH TAPING HEAD, CAPSTAN AND TAKEUP.

1—WIRE MACHINERY CORPORATION OF AMERICA 30 x 8 TRAVERSE CORD TWISTER.

All Machines Reconditioned in Our Own Shop

WIRE & TEXTILE MACHINERY INC.
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REELS SPOOLS

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MACHINERY FOR HIGH SPEED PRODUCTION

- BRAIDERS
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If you have a wire electric conductor that fails because of too short life.

We may be able to design an electric conductor from TINSEL that will give many times the life obtained by the use of stranded wire.

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THE MONTGOMERY COMPANY

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MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

THE MALIN & COMPANY
2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

Cut Your Product Cost . . .

Stop struggling with wire worries. There's a Continental wire to help cut products costs — to add sales appeal. Let us know about your problem . . . Let Continental's helpful wire service work for you.

CONTINENTAL STEEL CORP. STEEL CONTINENTAL WIRE KOKOMO, IND.

"Trade Mark" Pat. Off.

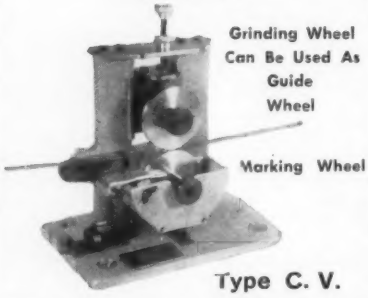
CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION
GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF: Manufacturers' wire in many sizes, shapes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special shaped wire. Also Continental Chain Link Fence, and other products.

ANNOUNCING!

MARKING AT THE C. V's.



Type C. V.

For marking and/or embossing wire, tubing, pipe or webbing.

- Marks on P.V.C.-Poly-Rubber-Nylon and Braided Wire HOT or COLD.
- Accommodates sizes .005" thru 3.00".
- Constant side as well as face wipe.

GEM GRAVURE CO.
WEST HANOVER, MASS., U.S.A.
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In the marking of extruded materials there are BIG advantages in ONE single source of supply.

1. Know-How
2. Inks
3. Wheels
4. Machines

The mill will produce copper tubes up to 200 feet and brass alloy tubes up to 100 feet in length and up to 4 inches in diameter. The casting of billets and hot extrusion of alloys into tube "shells" will continue to be done at Waterbury, while tube drawing, annealing and other related processing operations will be performed at New Milford. Since the early 1800's Scovill has been the pioneer in the casting of copper-base alloys and has specialized during the past 20 years in the production of brass alloys by continuous casting of billets for tube, rod and wire production, and flat bars for cold-rolling into strip and sheet.

Pressure Pads Replace Steel Fasteners

Specially designed zinc die cast pressure pads are replacing the old-fashioned steel nut, bolt and cup washer arrangement for holding together the large wooden spools used to store wire.

★ ★ ★

Manufactured by Paragon Die Casting Co., 5851 W. Dickens Avenue, Chicago, for **Howsam Spool Company,** Aurora, Ill., the new zinc pressure pads are made so that one part of the fastener is placed under the head of the bolt to replace the cup washer. Result: pressure is applied against the end grain of the wood causing the pad to hold tight regardless of the changes in the wood itself caused by moisture or dryness in storage areas. Unlike the older method of fastening, the new die cast pressure pads cannot work loose.

★ ★ ★

In addition, this unique fastener has been especially shaped to lock against the wooden spool and prevent turning. Once tightened by a square headed wrench, the indented pad head secures the bolt to restrict movement.

Appointed North American Representative for Breitenbach

Jedwin of Canada Ltd., 170 Bloor St. W., Toronto, Canada, has been appointed to represent **Wilhelm Breitenbach Maschinenfabrik G.M.B.H.,** of Westfalen, Germany.

★ ★ ★

One of the Breitenbach machines, a 36 wire take-up for galvanized steel wire was seen in The Parkdale Works of the Steel Company of Canada at the recent Canadian Regional Meeting of **The Wire Association.**

★ ★ ★

This novel and interesting machine differed from conventional take-ups in that instead of being provided with the usual rotating reels, the coils of wire were stationery and were fed by a rotating device. When a predetermined amount of wire had been collected on the spindle, it was pushed off, falling onto an accumulator below, to be removed at suitable intervals.

★ ★ ★

The announcement was made by **Fred Haiblen** of Jedwin.

New Catalog on Heating Alloys

A new catalog-manual covering

Chromel-D, a 35-20 nickel-chromium-iron heating element alloy recommended for use in controlled atmosphere furnaces operating at temperatures up to 1800 degrees F., is available from **Hoskins Mfg. Co.**, 4445 Lawton Ave., Detroit 8, Mich.

★ ★ ★

The 12-page illustrated publication, designated M-55D, lists complete prices and specifications on the alloy as supplied in wire, ribbon and furnace strip form. Also included is a temperature-resistance curve, tables giving resistance tolerances and physical properties, and basic factors to be considered in designing furnace strip elements, rod elements and coiled wire elements.

ASTM Prints Findings on Insulating Materials

A "Symposium on Minimum Property Values of Electrical Insulating Materials—STP 188" has been published by the **American Society for Testing Materials.**

★ ★ ★

This symposium was presented at a meeting of ASTM Committee D-9 on Electrical Insulating Materials, held in February, 1956, in Philadelphia, Pa.

★ ★ ★

Copies of the symposium papers are available directly from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. The book contains 50 pages, has a heavy paper cover 6 x 9 in. Price $1.75; to ASTM members, $1.35.

New Company to Make "Fused-Film" Wire

Adam Consolidated Industries, Inc. announced in May the formation of a subsidiary with an exclusive process for applying a thin film of insulation to copper wire that may revolutionize the design of electrical components in airborne, electronic, appliance and other industries.

★ ★ ★

Harold N. Leitman, president of Adam Consolidated, told a press conference at the Waldorf-Astoria Hotel that the new insulation will enter a market for magnet wire of all types that exceeds $500,000,000.

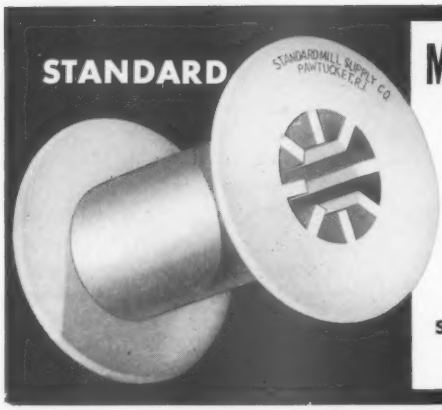
★ ★ ★

The new process, known as "Fused-Film" wire, uses Teflon tape to produce a thin film of insulation .002" thick that has unusually high dielectrical strength and heat, scrape, water, chemical and fungus resistance.

Despite the thinness of the insulation, "Fused-Film" wire can withstand high voltages and temperatures without failure, making it possible to design smaller units with greater electrical output.

★ ★ ★

Westinghouse Electric Corporation, Mr. Leitman said, has been testing the new wire for use in all motor drives in airborne equipment it will produce. These tests show that the magnet wire has



MOLDED WIRE BRAIDER SPOOLS

SMOOTH SPOOL HEADS will not break, warp, knick or rough-up—reducing maintenance costs. The instant locking feature saves time locating "dog-hole". Lighter than metal spools with less wear on Braider and Winder.

Contact us regarding your Spool Problems.

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WIRE DRAWING MACHINERY
AND EQUIPMENT

FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE

WRITE FOR PRICES

SUPERIOR TOOL & MANUFACTURING CO.
172 UNION STREET • WORCESTER, MASS.

TUNGSTEN CARBIDE WIRE DRAWING DIES

DESIGNED FOR LONG LIFE AND MAXIMUM WIRE PRODUCTION

Furnished semi-finished to within .001" to .002" of finished size at rough-drilled die prices. Require only light sizing and polishing before using. Our dies embody special design features that make for superior performance.

Also, a full line of carbide tooling for the Cold Heading Industry

EASTERN CARBIDE CORPORATION
NEW ROCHELLE, N. Y.

Increase- HIS METAL CUTTING POTENTIAL
Decrease- YOUR METAL CUTTING COSTS
WITH THE NEW PORTER WORK-STATION CUTTER

No matter what kind of metal you cut — wire, rods, wire rope, cable or any other kind, you can save valuable man hours in your metal cutting operations with the rugged new Porter Work-Station Cutter. Can be fastened to work station welding unit or bolted to a plank and used as a portable cutter. Available in a variety of types of cutter heads for specific requirements. Notched Shear heads for cutting wire rope or cable — Center Cut heads for cutting copper, brass, aluminum, soft steel rods or wire — Center Cut round edge for hard spring wire, etc.
Available in two sizes:
1B cuts wire and cable up to 3/8" diameter.
3B cuts wire and cable up to 9/16" diameter.

Send us sample of metal to be cut and we will advise proper type of jaws required. HKP®

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THE NELSON COMPANY
STANDARD OIL BLDG., BALTIMORE 2, MD.

WOOD
REELS!
10" TO 120" IN DIAMETER

SET-UP
or
KNOCKED DOWN

QUICK DELIVERIES

SPECIALIZING IN WIRE ROPE REELS AND INEXPENSIVE "ONE-TRIP" REELS FOR CABLE

Thirty years of experience in quality woodworking.

"200% greater dielectric strength and scrape resistance than the much heavier coatings now in use.

★ ★ ★

Specific uses seen for "Fused-Film" wire include radar, aircraft accessories, multi-conductor cables, small power tools, small motors, refrigerators and vacuum cleaners. It will be manufactured by **Inso Products, Ltd.**, of Union, N. J.

Techalloy Building Large Addition

A $650,000 expansion program will soon result in initial production from a new 24,000 square foot building at **Techalloy Company, Inc.**, Rahns, Pa. Full production will begin in December of this year.

★ ★ ★

Measuring 300 feet by 80 feet, the new building is a one-floor unit. Because of the production flow plan, material handling costs will be reduced by 25 per cent in this modern mill. Raw material comes in one door and finished products go out of another.

★ ★ ★

New equipment, was engineered by Techalloy for fine-wire drawing of Monel, Nickel, Inconel, Stainless and Heat-resisting Steels. Other equipment will consist of new slitting machines, modern four-high reversing mill for strip up to 8½" wide and bright hydrogen strand annealing furnaces.

Rip Wire Solves Tough "Unpackaging" Problem

Improved packaging of wire coils at Worcester Wire Works Division, **National-Standard Company**, created a potential problem for the division's customers: how to unwrap the wire without wasting time and effort. The problem was solved by the development of a special knurled rip wire which is part of the packaging.

★ ★ ★

Most of Worcester Wire Work's paper-packaged coils are wrapped first with heavy cellophane and

You Can Depend on "NATIONAL"
DIAMOND POWDERS
For Consistent High Quality
They Are ALWAYS Clean, Sharp and Accurately Graded for Use.
ONLY TOP QUALITY GRADES!
SPECIAL SERVICE

DIAMOND POWDER RECLAIMING
Our exclusive process gives maximum recovery, highest salvage. Send us your old cotton, die washings, sludge and wheels.

DIAMOND GRINDING WHEELS
A complete line of fine quality wheels for industrial production.

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All sizes

Finest Diamond Salvage Services

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CRUSHED & MICRON GRADED

DWS DIAMOND WHEELS
TUNGSTEN CARBIDE MATRIX
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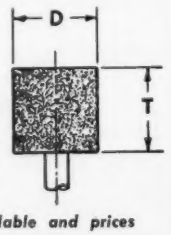

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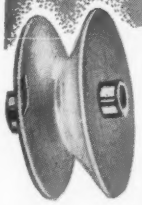

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Associated Spring to Build Two New Plants

Associated Spring Corp., Bristol, Conn., will establish two new precision mechanical spring manufacturing plants—one in Montreal, in the Pointe Claire industrial district 13 miles southwest of the city, and the other in Puerto Rico, in or near San Juan—**Carlyle F. Barnes**, president, has announced.

★ ★ ★

The plant in Montreal will be operated by **The Wallace Barnes Company, Ltd.**, a wholly-owned Canadian subsidiary, whose plant in Hamilton, Ontario, was established in 1921.

★ ★ ★

The plant in Puerto Rico will be the first precision spring manufacturing plant to be established in the Caribbean area. It will be operated by a new subsidiary company and should be in operation by January 1, employing about thirty people by the end of its first year.

Norton to Build New Grinding Wheel Plant

A new $6.5 million plant for the manufacture of grinding wheels will be built by **Norton Company.** When completed in mid-1959, the five acre plant will contain the most modern facilities for making organic bonded grinding wheels. This plant, to be known as Plant 8,

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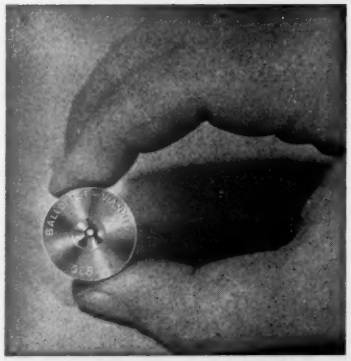

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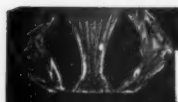
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Devises New Preassembled Nuts and Lock Washers

Harvey Jacobson, president of the **Jacobson Nut Mfg. Corp.,** announces that their plant in Kenilworth, N. J., is currently manufacturing preassembled nuts and helical spring lock washers, with serrations on the locking surface, under the trade name of "Spring-Nuts". They are now being produced by highly automated equipment, resulting in a low-cost, quality product.

★ ★ ★

These "Spring-Nuts" are available in steel, brass, aluminum and stainless, in a wide range of standard sizes.

★ ★ ★

For further information engineering assistance and samples, inquiries should be addressed to the Jacobson Nut Mfg. Corp., Box 117, Kenilworth, N. J.

G.E. Develops New Silicone

A new silicone rubber compound specifically designed for wire insulation is now available from the Silicone Products Dept., **General Electric Co.** Designated SE-975, it was planned for use on aircraft wire, motor and apparatus lead wire, defroster and hook-up wire, atomic Navy cable and other wire applications.

★ ★ ★

Offering a good combination of electrical and physical properties plus low water absorption, this material may be used in long service at 150 C and for many applications at 200 C. Capable of withstanding intermittent exposure to temperatures as high as 250 C, it will provide increased margins of safety under severe operating conditions.

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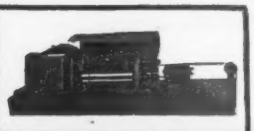
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Litzler, C. A. Co., Inc., Cleveland, Ohio

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CATALYSTS—For Fume Elimination
Oxy-Catalyst, Inc., Industrial Div., Wayne, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois
United States Borax & Chemical Corp., Div. Pacific Coast Borax Co., New York, N. Y.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Amplex Corporation, West Hartford, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion for Wire
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Products Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing & Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Amplex Corporation, West Hartford, Conn.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS
Amplex Corporation, West Hartford, Conn.
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Amplex Corporation, West Hartford, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Polishing, Asbestos Wire
Beard Machine Co., York, Pa.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adustable Speed
Allis. The Louis Co., Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio
Hubbard Spool Company, Garrett, Ind.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

ENGINEERS—Consulting
Bartell Machine-Tool Corporation, Rome, N. Y.
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Galvanizing Equipment
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Resisting Heating, Strand
Electric Furnace Company, Salem, Ohio

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Electric Furnace Company, Salem, Ohio

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS—
Bakelite Company Div. of Union Carbon & Carbide Corp., New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The. Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Bobbin Winders
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Morgardshammer Mek Verstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven, Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Forming Wire
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Galvanizing Wire
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Beard Machine Co., York, Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Labeling Electric Wire
Dewyer, Inc., Libertyville, Ill.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Company, Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pin Making

MACHINERY—Plating
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Polishing Asbestos Wire
Beard Machine Co., York, Pa.

MACHINERY—Printing on Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Re-Spooling
Bartell Machine-Tool Corporation, Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Emory, Robert J., Co., Newark, N. J.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Hodge Bros. Machine Shop, Ossining, N. Y.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Staple
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Breitenbach, Wilhelm, Unna, Germany
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
Bartell Machine-Tool Corporation, Rome, N. Y.
Godderidge Ste., Houilles, (Seine-et-Oise), France
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Stripping Electric Wire & Cable
Burdwood, Howard A., Inc., Portland, Maine

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Breitenbach, Wilhelm, Unna, Germany
Colbourne Machine Company, Winsted, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Bartell Machine-Tool Corporation, Rome, N. Y.
Cook Manufacturing Co., The, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Breitenbach, Wilhelm, Unna, Germany
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Fenn Mfg. Co., Newington, Conn.
Herborn, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammer Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Shelton, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MANDRELS—Extrusion
Bartell Machine-Tool Corporation, Rome, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. & D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT—ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Bakelite Company Div. of Union Carbon & Carbide Corporation, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Masonware Company, East Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Masonware Company, East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Nilson, A. H. Machine Co., Shelton, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Aluminum
Aluminum Company of America, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Aluminum Company of America, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Plastic
Hubbard Spool Company, Garrett, Indiana
Standard Mill Supply, Co., Pawtucket, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Masonware Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Bartell Machine-Tool Corporation, Rome, N. Y.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
Strecker, August, K.G., Limburg/Lahn, W. Germany

WHEELS—for Printing on Electric Wire
Gem Gravure Company, West Hanover, Mass.

WIRE—Aluminum
Aluminum Company of America, Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
Aluminum Company of America, Pittsburgh, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Crucible Steel Co. of America, Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

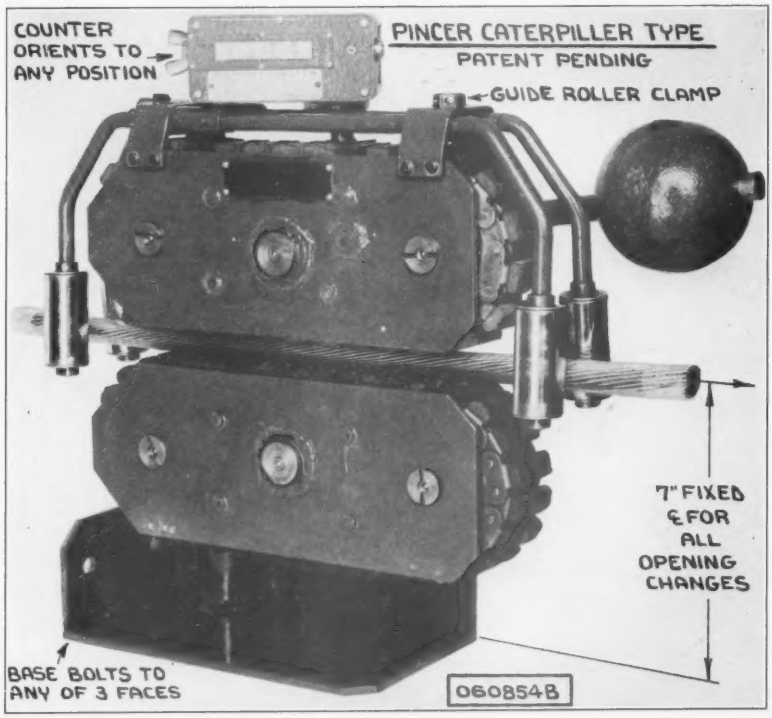
WATSON

CATERPILLAR MEASURING MACHINES

PATENT PENDING.

THESE NEWLY DESIGNED UNITS FULFILL THE LINEAL MEASURING MACHINE REQUIREMENTS OF ACCURACY, VERSATILITY, RUGGEDNESS, COMPACTNESS AND SIMPLICITY OF OPERATION, NOT ONLY FOR SMOOTH SURFACED PRODUCTS, BUT ALSO FOR PRODUCTS OF UNEVEN CONTOUR, SUCH AS, BX CABLE, ROPE, AND CABLED ELECTRICAL CONDUCTORS.

OUTSTANDING FEATURES OF THIS DESIGN ARE THAT WEAR OF TRACK TREAD DOES NOT AFFECT THE ACCURACY OF COUNT AND SINGLE ADJUSTMENT CONTROLS POSITION OF ALL GUIDE ROLLERS.


COUNTER ORIENTS TO ANY POSITION
PINCER CATERPILLER TYPE
PATENT PENDING
GUIDE ROLLER CLAMP
7" FIXED ℄ FOR ALL OPENING CHANGES
BASE BOLTS TO ANY OF 3 FACES
060854B

THREE TYPES AVAILABLE:

PINCER TYPE — SHOWN BY CUT, SUITABLE FOR MOST APPLICATIONS FOR PRODUCTS TO 2" DIAMETER. CONSTANT BASE TO CENTERLINE HEIGHT FOR ALL OPENINGS ELIMINATE PEDESTAL ADJUSTMENT FOR CENTERING.

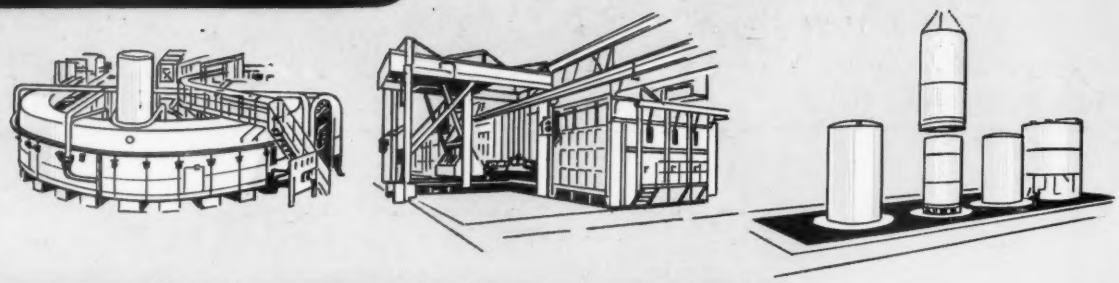
ARM TYPE — SIMILAR TO PINCER TYPE BUT WITHOUT LOWER TRACK ASSEMBLY FOR USE WITH STIFF PRODUCTS TO 4" DIAMETER. MOUNTED ON A SWIVEL BRACKET TO SWING CLEAR WHEN NOT IN USE.

TRACK TYPE — SIMILAR TO ARM TYPE BUT WITHOUT GUIDE ROLLERS MAKE THIS TYPE ESPECIALLY SUITED FOR MEASURING WIDE PRODUCTS SUCH AS FLATS, SHEETS, STRIPS, ETC.

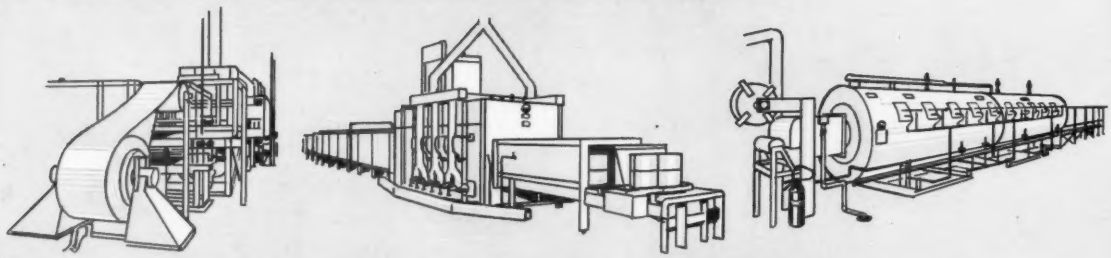
REQUEST BULLETIN ILLUSTRATING ALL TYPES

7-57

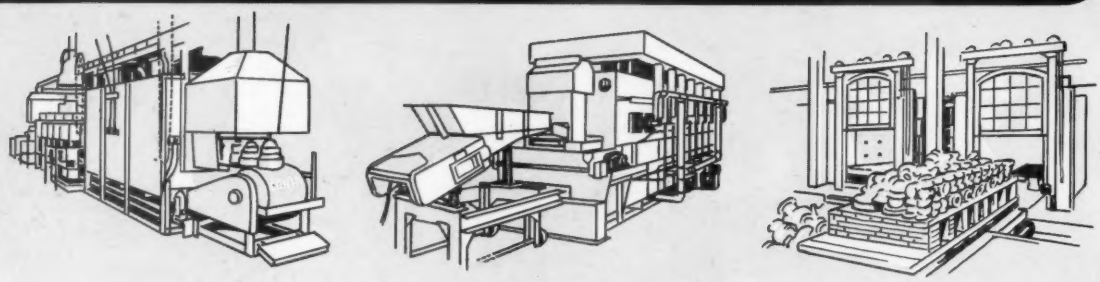
EF BUILDS



ALL TYPES AND SIZES



GAS FIRED, OIL FIRED and ELECTRIC



including the one that's best for you

It costs less to let experienced heat treating engineers handle all phases of your heat processing furnace projects. Then you can be sure the design and type of furnace, the method of heating, the special atmosphere, the material handling and other equipment are all best suited for your plant, product and process. All phases can be synchronized and coordinated to your production schedules, assuring the utmost economy and efficiency, and profitable, trouble-free operation.

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